

Some Triumphs of Modern Exploration

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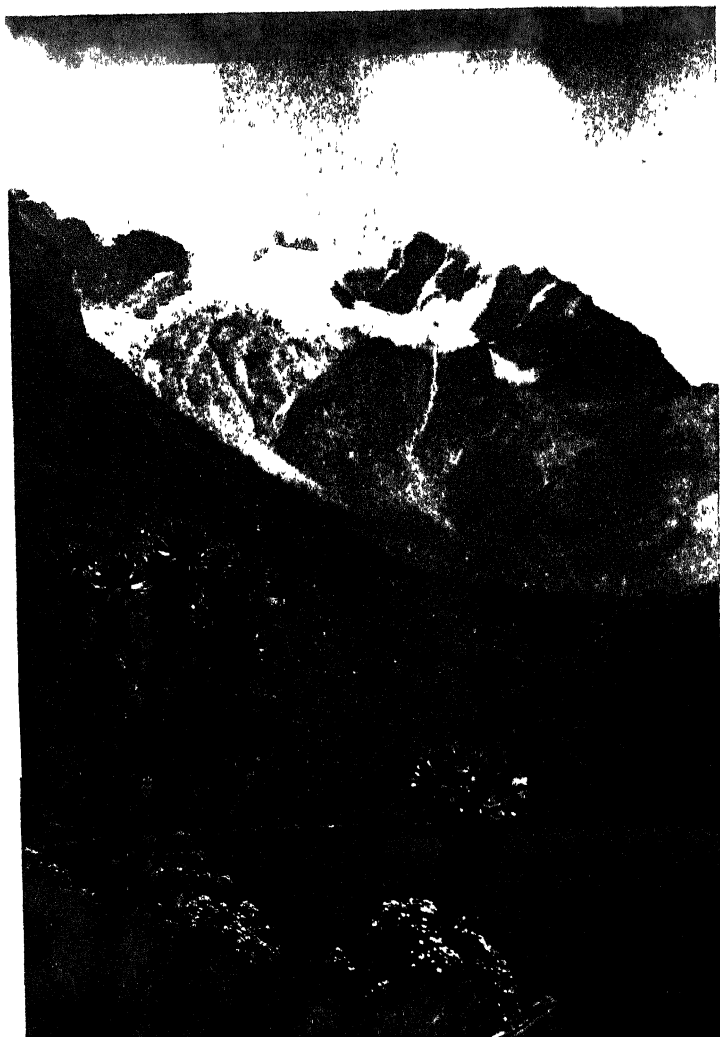
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TORONTO



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QUEEN MARGHERITA AND QUEEN ALEXANDRA PEAKS

*From a photograph by Vittorio Sella, who accompanied the expedition led by
H.R.H. The Duke of the Abruzzi*

Page 188

Frontispiece

Some Triumphs of Modern Exploration

BY

B. WEBSTER SMITH

Author of "True Stories of Modern Explorers"

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To
My Son

Contents

CHAP.		Page
	INTRODUCTION - - - - -	11
I.	IN AND AROUND LHASA, THE FORBIDDEN CITY -	15
II.	THE CONQUEST OF RORAIMA - - - -	51
III.	SIR JOHN MURRAY, AND THE BOTTOM OF THE SEA	71
IV.	PERSEVERANCE PEARY - - - - -	104
V.	IN INDIAN BORDERLANDS - - - - -	148
VI.	ADVENTURES OF THE DUKE OF THE ABRUZZI -	165
VII.	THE ATTAINMENT OF THE NORTH POLE -	192
VIII.	DR. THORODDSEN, GEOGRAPHER OF ICELAND -	215
	APPENDIX OF MAPS	

Illustrations

	Facing Page
QUEEN MARGHERITA AND QUEEN ALEXANDRA PEAKS	
<i>Frontispiece</i>	
THE POTALA, LHASA - - - - -	48
RORAIMA - - - - -	64
H.M.S. "CHALLENGER" - - - - -	96
COMMENCEMENT OF RAPIDS ON THE SANPO OR UPPER BRAHMAPUTRA - - - - -	160
SNAEFELLNESS RANGE FROM HELGAFELL, ICELAND - -	216

MAPS—SEE APPENDIX

TIBET MISSION, 1903-4

ASCENT OF MT. RORAIMA

CRUISE OF H.M.S. "CHALLENGER"

ROUTES OF REAR-ADMIRAL R. E. PEARY

BRAHMAPUTRA-SANPO

MT. ST. ELIAS

Introduction

Thirty years ago, or even less, any young man with a bent for travel and adventure had a generous range of unknown lands in which to wander. He might attempt the Antarctic, a mysterious region, and practically untrodden by the foot of man; or if the other Pole attracted him, he would have the inspiring example of Nansen (the *Fram's* drift across the frozen ocean being only four years old), while the uncompleted labours of Peary would leave him ample scope even in Greenland. If our budding Stanley preferred heat to cold, a dozen places in darkest Africa called for exploration and mapping; from the unknown depths of the Congo forests, with their pygmies and other savages, to the vast expanses around Lake Chad, the home of the cannibal, the slave-dealer, and the malaria mosquito. If, fired by the work of Sven Hedin and Doughty, deserts tempted him, then there was room and to spare in the stony wastes of Libya, Tripoli, Arabia, and Mongolia. If he elected to go East, then the waving palms of the New Guinea flats formed a green barrier behind which all was mysterious, savage, and totally unknown. If he went west, he would find on the Amazon many tributaries which had never been properly mapped, while even in Canada immense regions had scarcely been touched.

Introduction

Fourteen years later, when the Great War broke out, one of those waves of exploration which occur periodically had removed most of the principal blanks from our maps. In 1909 Peary had realized his heart's fondest hope, by attaining the North Pole; in December, 1911, Amundsen reared his flag upon the frozen plateau of the South Pole, and one month later Captain Scott followed him. The British flag had also flown in the "unattainable" city of Lhasa, and now Tibetan gentlemen even sent their sons to be educated at English public schools. Up and down the Andes, in and around the Himalaya, industrious and venturesome parties climbed, mapped and collected, steadily circumscribing the unexplored wildernesses. Sven Hedin and Stein had covered much of Central Asia with the network of their routes; and even more had been done in the same direction by Kozloff, Pevtsoff, and other Russian travellers. Boyd Alexander had crossed from Lake Chad to the Nile, and had just lost his life in a second venture there. Several great expeditions had learned as much about New Guinea as it was practicable to learn at that time. In a word, this was the period, *par excellence*, of successful exploration.

I invite you to look with me at the work of some of these Edwardian explorers; to share in a few of their hardships, to understand their disappointments, and to share in their joy at their achievements.

Such a series of excursions as is now proposed is the more fascinating since, although many of the actors are still living, they belong to an age which is just passing away; indeed, between the world of to-day and that of "before the War" an enormous gap intervenes, a gap that one cannot measure in years. Aeroplanes and an airship have crossed the North Pole, with no more fuss or preparation than a normal or ground

exploratory party would make in going from London to Lapland. Sir Hubert Wilkins and Commander Byrd have transferred the same methods to the Antarctic, where they have done more rapid or reconnaissance surveying in a short season than ground methods could have achieved in a decade. Dr. Hamilton Rice, employing a hydroplane, and getting his times for longitude observations by wireless, has surveyed a great extent of the Amazon tributaries which was formerly entirely unknown. Mr. C. W. Andrews and his coadjutors, with caterpillar cars (the commercial outcome of the tanks) has swept countless cobwebs off the Mongolian deserts, enabling large parties to be employed, and more work to be done in a season than would have been credible before the War; while even in the dreary wastes of the Libyan Desert and beyond, Hussanein Bey, Ball, Beadnell, and others have successfully employed cars in the traditional places where formerly only camels could be used. The explorer, therefore, must be equipped to-day with a good knowledge of mechanical and physical science, besides his purely exploratory qualifications; and no matter in what guise he goes forth into the unknown, he can calculate his hazards with a certainty which was impossible to his predecessors, and thereby he loses that extra spice of adventure which fell to their lot.

Of course, exploration is not confined to the land, since two-thirds of the earth are covered by the ocean; but for many reasons the exploration of the sea and such things as are hidden beneath its restless surface has lagged far behind that of the land. In order to convey some idea of how the mysteries of the deep have been partially plumbed, this book contains an outline of the life story of that remarkable man, Sir John Murray.

Introduction

For the facts contained in these narratives the author is chiefly indebted to the writings and lectures of the travellers concerned. In particular, the following have been specially drawn upon:

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SOME TRIUMPHS OF MODERN EXPLORATION

CHAPTER I

In and Around Lhasa, the Forbidden City

To some people the sign "Trespassers will be prosecuted" is a direct invitation to climb over the fence. Such persons are not necessarily born explorers—they might be merely poachers!—but they have at least one exploring instinct, the desire to penetrate into that which (because it is hidden) is mysterious.

Perhaps the best instance of this in records of travel has been the incessant endeavour to get to Lhasa, the chief city and holy place of Tibet; an endeavour that has almost invariably been thwarted by the prejudices and ignorant opposition of monks or lamas.

Besides its three great monasteries Lhasa contains a huge golden image of Buddha; its

unpaved streets are trodden daily by pilgrims and monks, all indescribably filthy, vacant of gaze, and muttering the inevitable Buddhist expression, "Om mani padme hum"; and as the sanctity of the city rested upon the rigorous exclusion of unbelievers, the one aim of the lamas for centuries has been to keep it undefiled by foreign footsteps.

Lhasa stands in a secluded valley a short distance north of the Sanpo, or Brahmaputra, the great river of Tibet. It is within 200 miles, in an air line, of Sikkim, that northern projection of India which is sandwiched between the buffer states of Nepal and Bhutan. A trade route passes along this road; and it was also used by the British Mission to Tibet in 1903-4. Ordinarily, however, the Government of India refused explorers permission to cross the frontier; so that they had either to pass round the western end of the Himalaya 1200 miles away, or else enter Tibet from the still more remote countries of Turkestan or Mongolia.

Although founded more than 1000 years ago, and long renowned for its temples, with their glittering roofs and golden idols, Lhasa remained unseen by Europeans until 1662, when two Jesuits, Grueber and Dorville, carried their creed thither; these men were followed by others in 1716. The Capucin monks also

established a mission there in 1708. None of these enterprises prospered, and eventually all foreigners were once more excluded. The great statesman of our early rule in India, Warren Hastings, made attempts to open up a trade with Tibet by way of Sikkim; but his ambassadors, George Bogle and Samuel Turner, got no farther than Tashilunpo, on the Lhasa road, where they were received well enough, but were restrained from proceeding farther. In 1811, however, a remarkable Englishman, Thomas Manning, penetrated to Lhasa, where he stayed unmolested for some time. The barrier was then dropped again; and only once between Manning's time and 1904 did a white man visit the city: this was the Abbé Huc, in 1846.

Lhasa is ruled by a High Priest, the Dalai Lama, whose power is such that he really dominates the country. The frequent Regents, likewise the Chinese Viceroy and the Tashi Lama, are also important men; but the real power lies in the three great monasteries of Lhasa, with their thousands of unwashed, yellow-capped fanatical monks. All these authorities normally pulled against one another; in fact, the only thing that could unite them speedily was hostility to the foreigner.

This was the position in the early 'nineties

of last century; when Tibet had for so long been a closed land that it had become a point of honour among explorers to attempt its penetration. So long as such adventurers kept in the remote northern or western provinces they ran no great danger, other than that arising from the loss of transport and the probability of starvation. Farther south, however, robber bands might pilfer them, and local headmen would be sure to try to thwart them, while on any of the main roads a whole army of scowling Tibetans would speedily bar their advance.

Governments also took a growing interest in the wild valleys and snowy passes of Tibet. For many years Russian expansion had been towards the east and south-east; and she had steadily swallowed up the independent states of Khiva, Bokhara, Merv, Samarkand, and Kokand. English politicians, and particularly English writers, loudly exclaimed that Russia was menacing India; with the result that a vastly greater interest arose in the countries bordering on India.

As Tibet was closed to Europeans other means had to be employed to glean something about the nature of the country, and what went on there. For this purpose specially trained natives were engaged. They were taught surveying in order that they might

bring back maps; and were dispatched to Tibet, usually disguised as merchants, with orders to attach themselves to caravans, to survey the routes, and sometimes to do special tasks. Their instruments, of course, were hidden among their wares—Chandra Das, for instance, hid his inside a prayer wheel; while the observations always had to be taken by stealth, and usually under dangerous circumstances; for if detected the unhappy men were liable to death, or at the least, slavery. Prayer wheels, by the way, are cylinders bearing large numbers of the words “Om mani padme hum”, written over and over again: the more numerous the words, the holier becomes the man who turns the wheel. The wheel has to be turned to the right; and in conspicuous places large ones stand by the roadside, with millions of these words inside them, printed on scraps of thin paper.

For measuring distances the native surveyors depended upon rosaries, which they carried in their hands; by this means they counted the paces from place to place. The mechanical work involved in thus measuring distances of 1000 to 1500 miles is immense, but it was done; and all things considered, a very fair idea of Tibet was obtained. One famous surveyor, Nain Singh, even stayed in Lhasa; another,

A. K., spent the greater part of the year 1879 there. These natives, however, had no eye for anything beyond their specific instructions; they could keep scarcely any records; and the information they had procured was extracted from them mainly by judicious questioning after their return. Thus, every fresh journey only whetted the desire of their masters for more accurate data, i.e. more *facts*.

This inquisitiveness concerning Tibet was not confined to those most interested, the British and Russians. W. W. Rockhill, a learned American, made three separate attempts to get to Lhasa, armed with every sort of authority from China; but, approaching from the north, he was turned back long before nearing the capital. Two French travellers, G. Bonvalot and Prince Henry of Orleans, also passing from north to south in an adventurous journey across Central Asia, made a dash for the place in 1890, and were only pulled up when but a single mountain range intervened between them and the city's golden roofs. Four years later another Frenchman, the unfortunate Dutreuil de Rhins, while on a similar course, was attacked and thrown while still alive into a river (probably the upper Yangtse-kiang) and drowned. Many other men crossed Tibet from west to east, or vice versa; and so

long as they did not venture too far south they remained immune. The two most troublesome people with whom the Tibetans had to deal, however, apart from Younghusband, were the indefatigable Sven Hedin and the iron-willed Littledale. Both of them got within striking distance of Lhasa, only to be turned back at the last moment. Littledale's famous journey, in 1895, was highly adventurous, and we will follow him now.

St. George R. Littledale was primarily a hunter of rare wild animals, especially the very shy Asiatic sheep, *Ovis poli*, and the wild camel; but with his hunting he combined surveying, and he always chose out-of-the-way places for his journeys. He had already had considerable experience of Central Asia, having twice crossed the Pamirs or high mountain valleys north of Chitral, besides making the long through journey from Turkestan to Peking. He knew to a nicety the wily ways, unending procrastination, cupidity, and childish cunning of the Oriental; and he went provided with a large supply of the sinews of war, *i.e.* money. This was carried in silver bars; and when his change ran out he had to have them chopped into small pieces by a local blacksmith.

With him went Mrs. Littledale and his fox terrier, both of whom had braved the exposure

and risks of the region before. His nephew, Mr. W. A. L. Fletcher, a giant young man six feet six high, completed the party.

Thanks to Littledale's admirable faculty for getting on good terms with Russian officialdom the little expedition and its bulky baggage passed without delay across the huge Russian Empire, from the western shore of the Black Sea to the limits of eastern Turkestan. They travelled under the shadow of the jagged Caucasus; crossed the Caspian Sea in a crowded lake steamer; and thence went, mainly by tarantass (a wooden cart), to Merv, Bokhara, Khokand, and Kashgar; then on to Yarkand, a great caravan mart, whence roads run to Kashmir on the south, Turkestan on the west, and China on the east. Only a few years earlier these names would have brought a thrill to one's blood; for the places were hornets' nests of brigands and half-wild petty chieftains, to whom murder was an every-day occurrence; and anyone who ventured thither certainly took his life in his hands. For instance, when Vambéry, the celebrated Hungarian Jew, visited Bokhara in 1863 he had to travel completely disguised; and even then his adventures were little less remarkable than those of Sir Richard Burton, who by similar means had penetrated to Mecca ten years before. By

Littleddale's time, however, all the principalities had been swallowed up in the strong embrace of Russia, and travelling had become as safe as is possible in a land where thieving instincts are so well developed. It is worth noting that this preliminary journey to Yarkand, involving the transport of all the most valuable portion of the baggage, amounted to 4500 miles.

Littleddale's intention was to reach the high Tibetan valleys in the spring, when the scanty grass supply would be fresh and young; otherwise he would have been compelled to carry fodder for all his animals throughout, because during the colder months it is hard to detect a living thing there. Accordingly, the first part of the long journey took place during the bitter mid-continental winter. It was sometimes so cold that water poured into a glass froze ere it could be drunk.

While at Kashgar, they met a man who was destined to cause the Tibetans even more trouble than themselves, Dr. Sven Hedin, who was already well known for his desert journeys in Persia, Turkestan, and adjacent parts. The Chinese authorities at Kashgar regaled the two explorers with a dinner, at which the following curious fare was provided: "Eight dishes of sweets, cut into small pieces; then followed sharks' fins, sea slugs, bamboo shoots, and

numberless greasy dishes." The Asiatics of this part, like most races who are uncertain when they will get their next meal, are inexhaustibly greedy, and will speedily eat a whole sheep, continuing at the table long after the European has reached satiety.

From Yarkand, Littledale travelled eastwards for a long while on the Peking caravan road; crossing uninteresting wastes, with the huge dunes of the Taklamakan Desert on his left, and a mighty snow-clad mountain range, the Kuen Lun, on his right: the latter formed the northern battlements of Tibet, and sooner or later he would have to force a way across it. Finally he stopped at Cherchen, a town in the desert, where he engaged men who were supposed to know the way across the Kuen Lun. As supplies would henceforth be unobtainable anywhere, he also acquired 250 animals and numerous carriers, a flock of sheep, and 11 tons of Indian corn. Twenty-four days were spent in Cherchen before this large caravan could be collected; during which haggling, arguing, and bullying went on, in a manner only known to those who have to deal with Asiatics.

On 12th April they at last got away. Wood soon became extremely scarce, and they were forced to rely upon the standard fuel of that

region, dried camel dung; this is known as *burtza*, and it gives out a pungent blue smoke, and coats everything in the vicinity with soot. Rivers across their path occasioned difficulty, sometimes necessitating long detours before they could be forded, for there were no bridges. At one place a stream ran across the centre of a frozen marsh, with banks of ice 4 or 5 feet high on either side; down the channel cakes of ice gaily floated with the torrent, and one of these caught Littledale and his pony, and carried them some way down before they could recover. A way down to the water and up from it had also to be cut by breaking away the ice cliffs with axes. A little later the drivers became alarmed as their distance from Cherchen lengthened, and they asked to go back; but Littledale refused, and by promises induced them to continue.

On 28th April they were high in the mountains, and succeeded in crossing a pass in a snowstorm; however, still higher mountains loomed ahead. They had no guide who knew anything about the district; there was no fuel and no green fodder; and without fuel they could not melt the ice so as to get water. By persistence, however, things improved. Next day the country opened out; water and grass came in sight; and as the men assured them

that they were now in Tibet most of them were paid off, being sent back with all the surplus animals. Alas for Turki veracity! They soon found that they were still on the wrong side of the main mountain chain; and going up one valley and down another, looking for a pass, in bitter weather, with frequent snowstorms, was slow, disheartening work. After ten days of it they at last found a way over into Tibet, but the ascent cost them five or six donkeys and two horses, and the death of an animal meant of course the redistribution of the loads. It was a great relief to Littledale to find the snowy peaks behind him; in front stretched a limitless prospect of flat plains, bordered by distant mountains, and usually containing cold, clear blue lakes.

When we talk of the Tibetan plateau an idea rises in the mind of a high plain buried in snow and containing only a few miserable inhabitants. This is altogether wrong. Tibet is not really a plateau at all. It is a series of very high valleys, mostly about three miles above the sea, all running more or less from west to east, and separated by eight great chains of mountains; owing to the great altitude of the valleys the mountains exceed them only by 2000 or 3000 feet, though occasionally giants soar much higher. The seven main valleys

are broken up by cross hills into innumerable small basins, most of which contain lakes and very little else; and the mountains come down to these valleys like cliffs to a shore, often ending there with wonderful abruptness. Except in the south there are no trees, and only in the more favoured districts will grass grow. Most of the rain falls in the south, and here we find the great bulk of the people, congregated in Lhasa, Gyangtse, Shigatse, and other towns, with cultivated fields, temples, gilded images, and all the paraphernalia of their all-powerful religion. In the centre of the country are some celebrated salt workings by the shore of a lake, from which the Salt Road goes to Lhasa, for salt is a Government monopoly. The lonely northern valleys also contain extensive shallow gold workings; and from this district the Gold Road goes likewise to Lhasa, gold being another Government monopoly. As conscience is also a Government monopoly, the poor ignorant nomads, with their cattle or yak, and sheep and goats, have very little that they can call their own, except a view of the cold blue sky, the barren plains, and the dull grey or bluish mountains.

Anyone approaching Lhasa from the north-west, as Littledale did, must cross seven of the mountain systems in succession. It is not really difficult, except at one or two points,

as there are numerous gaps; but even in the valleys one is constantly at the level of the top of Mt. Blanc, and the rare air makes exertion strangely laborious. One's heart beats as if it would burst its prison, and the prospect of a climb up even an easy pass is a dismal one. The greatest difficulty, however, is to keep the animals of the caravan alive; for throughout the first part of the journey all their food must be carried on their backs. No sooner does one get into the slightly more genial southern valleys than Tibetan shepherds become common, while the plains are dotted by their herds of yak or sheep; and these people are bound, under penalty of a horrible death, to report to the lamas any foreigners found roving the land. Consequently, if one attempts to feed one's animals at these points, one's presence is soon detected; and as the news passes by word of mouth with extraordinary rapidity, opposition can be placed in the travellers' way before they are even aware that their movements have been seen.

Knowing all this, Littledale took good care to keep out of the way; and for a long time his southward progress was made by hopping into ravines and behind cliffs, so as to avoid any natives whatsoever.

For some time this plan succeeded. Besides

the three Europeans there were now only ten carriers; and the worst risk they ran was entailed by the morning round-up of beasts that had strayed away. In the north, where no Tibetans were seen, numerous antelope dwelt; they were so tame that one ran along beside the caravan. Unfortunately, wolves also abounded, and one night they raided the caravan, killing the entire flock of sheep.

The party now passed across a succession of short, steep passes, while the weather continued bitterly cold, drifted snow cutting like crystals of glass. The poor animals, deprived of fresh food and weakened by long exposure, lay down, and neither shouts nor blows could raise them; some had to be shot, to put them out of their misery; and every day, as the transport weakened, the loads increased, until at last it became necessary to abandon all creature comforts, taking forward only what was essential to get to Lhasa. Just as things were looking bad they came to some good grazing; here they stayed a week, fattening up their animals.

On 26th June they saw the first men since leaving Cherchen; they were Tibetan salt collectors, and in order to avoid them Littledale made a night march, but got stuck in an unsuspected swamp. With much muttered bad language from the carriers, and much heaving

and hauling, they got out again; and after marching all night camped in a secluded valley on the Lhasa side of the Tibetans.

From this time onwards Littledale and his nephew always went in advance, armed with telescopes; and whenever they detected the sheepskin coats of the nomads they changed their course. Frequently it became necessary to camp during the day in a ravine, and to make a march the next night past sleeping natives; herein they ran a risk from the savage Tibetan dogs, but always they escaped detection. It was a near thing, however, more than once; as when a cock and hen fell off a donkey's back and began to clack. While the owner's fingers itched to strangle them a mule trod on a Turki dog, and started it howling! On another occasion they ran into some shapeless forms in the gloom, and procuring lights found that they were only yak!

In this way they crossed like robbers from valley to valley, steadily approaching Lhasa.

The method had its disadvantages. They could not use the main road, of course, and once they came to a river that was too deep to be forded, while a populous plain lay beyond. At this juncture they made a boat out of the camp bedsteads and the tent ground sheet, and with the aid of a rope ferry safely carried

everything across in this strange craft. Resource is the explorer's right hand: Mr. G. M. Dyott, when in the Amazon wilds, once damaged his camera so that light got in, but he repaired it with the latex from a green banana. A dozen other cases of this adaptability among explorers leap to the mind.

The Littledales had now almost reached the end of their tether. They came to a valley which had to be passed, and in which there were thirty tents; so with a bold air they went straight on and passed through unquestioned, probably being taken for merchants. The next day, however, some shepherds detected them, and the hunt was up.

Lhasa was about eight forced marches away. Littledale determined to try to reach it before the local officials could collect their wits or their forces. Accordingly, he now stuck to the road without any pretence at hiding, maintaining a series of running interviews with village headmen and others who threatened or implored them to stop. Crowds of so-called soldiers, armed with swords and ancient matchlocks, and mounted on the stocky Tibetan ponies, escorted the little caravan; and whenever it halted there was much confusion and gesticulation. Littledale, who had no guides, was compelled to rely to some extent upon

these people for the road, and he soon found that whenever they opposed a projected line of advance the correct road was indicated; on the other hand, when they permitted the caravan to advance without hindrance, the course was a wrong one. Once, by doubling on their steps and retreating down a valley, the little party threw the Tibetans off the scent, but generally some of the grimy, stupidly smiling little men were to be found hanging to the travellers like leeches.

Under this strain most carriers would have deserted, and as it was, prayers to Allah were both frequent and vehement. Littledale, however, had some fighting Pathans in his caravan, and these men formed a stiff nucleus which could be depended upon in case a fight ensued; while he and his nephew were not the sort of men to be stopped by anything short of actual violence.

In this way they came at last to the blue waters of Tengri Nor, the largest lake in Tibet. Here Bonvalot and Hedin had been turned back. Beyond a river lay a maze of dark ravines, leading up into the heart of a gigantic mountain chain, with snowclad peaks; and beyond that was Lhasa. Unfortunately they did not know of any way across this range, nor, naturally enough, would the Tibetans help them; but

after some wandering they found a valley in which all the grass had been cropped by animals. Arguing from this circumstance that it must be a much-used route, they began to ascend it; it closed in, becoming a narrow gorge, while masses of fallen rocks littered the ground. Suddenly they were hailed to stop, and there, hiding behind every rock, were the Tibetans, armed with ancient but quite serviceable matchlocks, and determined to dispute the road. Littledale went forward, waved his Chinese passport about, and explained, with appropriate gestures, exactly what would happen if the Dalai Lama learned that he had been detained, but such threats had no more success than those of previous travellers had done. "Back you go!" was the cry. He then ordered his men to load their rifles; and at this indication of serious trouble the Tibetans became alarmed and hung back. Littledale at once ordered his caravan to advance, and the murmuring mob was soon left behind.

Shortly afterwards they climbed over one of the highest passes in the world, the Goring, 19,587 feet above the sea. The top was simply slippery ice, flanked by bare mountain walls on either side; part of this glacier was broken by crevices, and treacherously steep on the Lhasa side. It was snowing hard, the thin needles

blowing into their faces and reducing the visibility to a hundred yards or so.

Had they pushed on at this critical juncture they must assuredly have got into Lhasa; but unhappily the transport had lagged behind, the donkeys experiencing great difficulty in getting over the high pass. When at last they did arrive at the camp that had been made below the glacier, they were exhausted. Another day was lost in resting them, and in this interval the Tibetan resistance at last became effective.

Lhasa had become alarmed. Littledale, standing at the door of his tent, heard the clatter of hoofs; a cloud of dust ascended the valley, and from it there emerged "a comical, jovial, roundabout" person, evidently a high official, accompanied by about a hundred armed men. He wore a broad-brimmed hat carefully covered with green oiled silk; and he explained, squatting on the ground in characteristic fashion, that if he permitted the party to continue he would certainly have his head cut off; nor was this mere bluff, as some people who contributed to the subsequent advance of the British Mission were most cruelly done to death in consequence. The Englishmen, at that moment, had nothing to fear; they had plenty of provisions, and time was of no consequence, whereas a row might have brought on fatal results. Rightly or

wrongly, the traveller stopped. The next day three new officials arrived, with more soldiers. A letter was written to the Dalai Lama requesting permission to proceed; the only result being a week's delay, while more and more soldiers arrived.

Meantime, Littledale hoped to beat the Tibetans at their own game of dallying, and amused himself by catching butterflies and plant collecting. Lhasa now regarded him so seriously that the Governor of the city and the head of the army arrived, with specious arguments, and impressive in their richly jewelled clothes. They said he must go back. He retorted, "Impossible!" He insisted on going forward; and they replied, "Impossible!" Meanwhile, the season was drawing on, and if the fates were propitious, an early autumn snowfall might close the pass, and compel the Englishmen to remain in the Lhasa valleys. The city was distant but little more than a day's ride. The Governor, an elderly and extremely wily old rascal, did not dare to lay violent hands on his unwelcome visitor; in fact, he did not know what to do with him. At this moment a totally unexpected event changed the aspect of affairs completely.

Mrs. Littledale, who had long been ailing, became seriously ill. The great altitude, the

daily exertion in the rarefied air, and the hardships inseparable from such a journey, had told upon her, so that medical treatment became an urgent necessity. Littledale at once threw up his plans, despite her protests. He offered a bribe of about £400 to the temples if he were allowed to pass through Lhasa, and down to India by the shortest route, but his communication was never allowed to leave the camp. Realizing their advantage, the other side insisted that he should go back by the way he had come.

Of course he refused, but at last, in desperation, he consented to return to Ladak, a mere 1200 miles, but by a different route along the central valleys. He insisted on a letter from the Governor saying that all men must help him; it was solemnly written out, and on being translated, was found to read, that all men must turn him back, and not allow him to put a foot on Tibetan territory. He tore it up, and demanded a proper one; but on the very same day as the old Lama wrote it, he sent out another, telling headmen to turn Littledale back, wherever he might be!

Sadly the little party began its retreat on 29th August. Mrs. Littledale was now incapable of walking, and wood had to be procured from Lhasa with which to make her a litter.

At the dreaded Goring Pass, to which they were escorted by Tibetan soldiers, she took to a yak, on which she rode over the glacier. No sooner were they all safely over than the Tibetans left them, secure in the belief that they could never get back again. Only five men were available for the sixty baggage animals, which strayed all over the place; urgency was needed, both because of Mrs. Littledale and of the onset of the bitter Tibetan winter; and the leader had an anxious time, shepherding his men from valley to valley, besides mapping the route as he went.

Eventually, however, they got out of Tibet without much difficulty, except for one incident, when the Governor's treachery was detected. A headman in Rudok, who had received instructions to turn them back, insisted on their going all the way back to the Goring Pass. When they produced their rifles he sullenly gave way.

So ended a long and very important journey, which, although it just failed in its main object, added materially to our knowledge of Tibet.

Apart from the adventures of Littledale and Hedin, the principal interest of Tibet became political. A Mongolian of Russian training, named Dorjief (he had other names, but this was his most familiar one), went to Lhasa,

where he long resided among the monks, acquiring a considerable influence over the Dalai Lama. Russia naturally seized this opportunity of extending her influence; and a treaty between that power and Tibet would probably have been signed, but for the opposition of the Chinese Viceroy and the still more important hostility of the three great monasteries. An anti-British reaction occurred, however, which gave Lord Curzon, then Viceroy of India, an opportunity of intervening. After much argument with the home Government, a Mission was decided upon, under the leadership of Sir Frank (then Colonel) Younghusband. With him were two other remarkable men: Captain O'Connor, who had an immense knowledge of Tibet and things Tibetan, and Mr. Claude White, almost the only Englishman who at that time was *persona grata* at the secluded little court of Bhutan.

The object of the Mission was to demand an explanation of a Tibetan invasion of part of Sikkim, to re-establish trading arrangements, and to insist upon the residence of a British representative at some prominent place in Tibet.

This Mission, which was not at first accompanied by the military, went to Kampa Dzong, a town in southern Tibet at the back of Mt. Everest; and there it stayed from 7th July,

1903, to 6th December, without in any way furthering its objects. The Tibetans first, last and always sent men from Lhasa who, whatever their authority, were not empowered to do anything. Their only argument was the parrot cry "Back to the frontier!" and they were quite incapable of understanding that the British meant business. The Dalai Lama, who was entirely under Russian influence, thought by this constant dallying to wear out the patience of the invaders, in precisely the same way as he and his predecessors had forced ordinary travellers to withdraw; and in this he had an unwitting ally in the British Government, which was loth to undertake what appeared to be an invasion of Tibet. Younghusband, however, was not the man to be trifled with. He knew from the start that the Mission must end up in Lhasa if it were to do any good; and to Lhasa its steps were directed by the inexorable trend of circumstances.

It being evident to all by the autumn of 1903 that the Tibetans would neither treat nor fight, military preparations began. The road to Kampa Dzong and that to Lhasa, though side by side, were separated by high mountains. It was therefore necessary for the Mission to retreat, in order that it might advance again along the easier road which had been chosen

by the troops. These movements took place simultaneously.

Advancing through Sikkim with about 2000 men, General Macdonald established himself in the high and hitherto unoccupied Chumbi Valley. He had under him six companies of those hardy hill fighters, the little Gurkhas, and eight companies of Sikhs, all, of course, with British officers. Besides this, there were sappers, a machine gun, and some mountain guns, together with all their transport. It was necessary for a great part of the way to make a road for mules, the guns being carried on the backs of those sturdy beasts. The track sometimes tunnelled amongst huge rhododendron trees, interlaced with a hundred creeping and climbing plants, sometimes emerged on the edge of a precipice many hundred feet deep. At some places it was so bad that mule transport was at first impossible, and here all the supplies had to be manhandled. Nevertheless the remarkable feat of getting up all that was needed for the little army went through without a hitch, thanks chiefly to the organizing powers of Major Bretherton.

All being ready, the troops started north on 11th December, 1903, in the depth of winter, to cross the Jelep Pass, a high gap between the mountains, on one side of which lay the forested

valleys of Sikkim, while on the other were the barren and bitterly cold high valleys of Tibet. On entering the Chumbi Valley they were soon brought up by a wall at Yatung, which the Tibetans occupied, and were preparing to defend. The orders of the Mission were to avoid fighting whenever possible, but at this anxious moment it looked as if war must break out. As the leaders rode forward, however, the Tibetans came out to meet them; they protested, but did not oppose the advance; the gates opened, and this valuable post was gained without a blow.

The Tibetans were under the impression that their long, bitter winter, with its severe snowstorms and its furious gales, would render impossible any protracted stay on the part of troops fresh from the hot plains of India. In order to impress them, therefore, an advance guard of about 450 men, together with the Commissioners, went on down the Chumbi Valley, crossing the very high and cold Tang Pass; the town of Phari was entered without opposition, and eventually they established themselves at a place called Tuna. Here, at an altitude of 15,000 feet, they stayed through the winter. In all these operations, remember, the troops were rarely at a much lower altitude than the top of Mt. Blanc. Besides the weariness

naturally induced by the rarefied air, they had the additional disadvantage of having to carry rifles and accoutrements.

For three weary months the negotiations dragged on without result. Officials of sorts made their way to Tuna, while the Chinese Viceroy, whose authority had been flouted at Lhasa, was openly in favour of treating with the British; but the men who mattered—the grubby, oily little monks, in their crimson or saffron robes, with yellow caps and jewelled ornaments—held aloof. Nine miles north of Tuna, at Guru, a small Tibetan army lay encamped, and thither Younghusband went one day, accompanied by O'Connor. They were received very badly by three Lamas, the representatives of the three great Lhasa monasteries, and for a moment it looked as if they would be surrounded and massacred. By a great display of indifference, however, they overawed the enemy, and withdrew. It was quite clear now to everybody but the Government in London that if British prestige were to be maintained an advance on Lhasa was essential; nevertheless, that advance only came about later, as a result of further humiliations.

During this time the difficult task of pushing up stores to the Chumbi Valley, and constructing a road over the worst places, went on

without a break. Meanwhile, the people of that part of Tibet, impressed by the English policy of always paying well for whatever they took, and of not interfering unnecessarily with the customs of the country, everywhere received them with pleasure. Even the abbots and monks of monasteries along the route were willing to admit them, although they hid their most precious ornaments in the nunneries, "because the English were known not to attack women". Only from the bigoted fanatics of Lhasa did opposition proceed; and until these monks were taught a lesson no further progress was possible.

Accordingly, on 29th March, 1904, Macdonald set his troops in motion, marching across the Tang Pass in the teeth of a blinding snow-storm, towards Gyangtse, one of the chief Tibetan towns. Preceded by mounted infantry (whom the Tibetan troops soon came heartily to dread) the long column wound its way down the barren valleys, past the advanced post at Tuna, and pulled up before Guru, where the Tibetans made a stand. The enemy had built a wall, but only partially across the valley, and it was the easiest thing in the world to outflank it and take them in the rear. They were so surprised at this operation that they allowed themselves to be herded together, and

were being disarmed, when their general, in a sudden fit of courage, or madness, or both, fired at a Sikh, and wounded him. This first shot not only started pandemonium, but it opened the Tibet Campaign. The Tibetans, many of whom still possessed both swords and guns, suddenly turned on their Gurkha and Sikh captors, and in the *mêlée* might have done much damage had they not been caught by an enfilading fire from both slopes of the valley. The fight was soon over. The enemy turned and fled, leaving many dead and wounded behind.

The expedition then moved slowly on to Gyangtse, with no more serious interruption than the discharge of a few ancient muzzle-loading cannon, weapons that were out of date even at the Battle of Waterloo. These *jingals* are fired at high angles, shooting a ball of lead about the size of a cricket-ball, and rarely hitting anything except the ground; indeed, when they go off, there is much more risk to the gunners from the explosion of the charge than to those for whom the missile is intended.

Gyangtse lies in a wide flat plain, between the inevitable steep hills. It is dominated by a large fort, placed on a hill rising out of the plain, and looking for all the world like the castles drawn by imaginative artists in fairy books. Wide steps lead up one side, being

overlooked by strong defences; on the other sides the precipitous rock is crowned by the castle walls. In the hands of real soldiers the place would have been a serious obstacle; but the Tibetans, discouraged by their losses at Guru, abandoned it. The British found there an immense quantity of stores, which they appropriated; but for some inexplicable reason the desire not to hurt the Tibetans' feelings overcame military prudence, and the fort was not occupied. Instead, an armed camp was established less than a mile away, at Changlo, within easy range of the guns of the fort. All the Tibetan quarters being too verminous to sleep in, the officers throughout the campaign occupied tents.

This was in April. Negotiations were now renewed; but in the middle of them the Tibetans determined on a treacherous attack upon Changlo, with the idea of destroying the Mission entirely. The opportunity was favourable. Part of the British force had been sent on to occupy an important cross-road, the Karo Pass, and the great bulk of the troops were some way distant, with Macdonald. Only Younghusband and a handful of men remained in the armed camp.

The Tibetans had 1600 men. On the night of 4th May, half of them advanced silently

upon the fort, which they occupied without resistance. The other half crept up to the wall of the camp, and were almost over it before a sentry saw them and fired. Then pandemonium broke loose. Bullets ripped a way through the mud walls of the camp, the position of which was defined throughout the hours of darkness by a ring of fire. With remarkably slight losses the attack was beaten off, the enemy leaving 180 dead outside the walls, and carrying off their wounded.

There now ensued for Younghusband two anxious months of siege, or rather of investment, for he maintained daily communication with Macdonald, while the enemy even neglected to cut the telegraph wire. There were about two dozen of the ancient muzzle-loaders in the fort, with which a daily bombardment of the camp was maintained, though I believe not a single man was ever killed by it. This serio-comic warfare lasted until the General came up in June, and relieved the Commissioner. The investment of Changlo had one advantage. It at last convinced the Home Government of the need for an advance to Lhasa.

In the meantime, Colonel Brander, with the bulk of the camp defenders, who had been absent when the night attack took place, had carried out one of the most extraordinary

battles on record. The Karo Pass is some 16,000 feet above the sea. Commanding the roads to Lhasa, Gyangtse, and a third important town, it was vital that it should be kept clear. The Tibetans had built a stout granite wall across it, constructing openings whence rifle fire could be directed upon any assailants; this wall stretched right up to the mountain sides, and was protected by strong earthworks.

Diverting the enemy's attention by the semblance of a frontal attack, Brander made his Gurkhas climb an extremely steep cliff and cross a glacier, somewhere about 18,000 feet above the sea; thus they were enabled to take the Tibetan defences in the rear, when of course, after a short fight, the whole position collapsed and the enemy fled.

With the arrival of summer, the Mission, accompanied by its steel-headed arguments, moved on from Gyangtse to the bank of the Brahmaputra, Macdonald systematically clearing out the Tibetans from every stronghold *en route*. There was very little further fighting, and none at all after they crossed the river; but a constant succession of deputations from Lhasa arrived, dressed in all the colours of the rainbow, and begging Younghusband not to proceed, but of course without avail.

It took a week to cross the Brahmaputra;

but the enemy had had the incredible stupidity to leave ferry boats there, and by their aid a communication was established across the broad, swirling stream. Some military boats that had been brought up by the expedition proved too light for the treacherous whirlpools; one of them upset, an accident in which Major Bretherton, the principal transport officer, was unfortunately drowned.

The way to Lhasa lay round the foot of a glacier that fell from the flanks of a mighty peak, and then up a long winding pass; this was an ideal post for defence, and great preparations had been made to hold it, nevertheless it was abandoned to the English. They then came to a broad, flat valley, surrounded by steep hills. In the far distance, clearly visible above the scattered trees, stood a huge rock, on which a white mass soared boldly heavenwards, terminating in a roof of beaten gold. It was the Potala, the Great Palace, and the gateway of Lhasa. The holy city was in sight at last!

Those who rode on first encountered sullen, dirty, and nauseous monks, mostly clad in filthy red gowns. Lhasa itself proved to be an insignificant little town of flat-roofed one-storied houses, separated by unpaved streets in which pools of dirty water and piles of garbage had accumulated. In the midst of all this rose



E 281

THE POTALA, LHASA

*By permission of Lt.-Col. F. M. Bailey (who took the photograph) and The Royal
Geographical Society, London*

a splendid cathedral, with a golden roof. By far the most striking object was the Palace or Potala, which rose nearly 500 feet above the plain, and looked like a huge white prison, with its square windows and its long straight stairway of approach.

Now began the worst task of the Mission. The Dalai Lama and his Russian adviser had fled. A Regent and three others formed the Council; but nothing could be decided without the monks, for nobody had any authority. The result was that for weeks interminable conversations went on. The same things had to be said over and over again; the same sentiments expressed; the same sort of wash, miscalled tea, drunk (it is a mixture of black tea, rancid butter, salt, and warm water, and is indispensable in Tibetan life); and the same wearisome efforts made to convince the Tibetans of the justice of the British claims.

Eventually, by combined firmness and patience, Younghusband won this campaign as completely as the troops had won theirs. The first British Resident, O'Connor, took up his post at Shigatse. The frontier was readjusted. Russian hopes receded, apparently for ever.

Although the prohibition to visit Lhasa was again instituted, Lhasa has been visited since by Europeans on a number of occasions. The old

prejudices, however, fostered by the continuance of the monkish rule, are impossible to eradicate; but in other respects than admittance to the sacred city the Tibetans are now much more amenable to reason. They were also severely dealt with by the Chinese, whose authority had been nominal too long. The result of all this was that when Younghusband made representations before the Everest expeditions of 1921-4, permission was freely granted to enter the country; and the abbot of the monastery nearest to the mountain even blessed the enterprise.

While in Lhasa, the British officers saw a good deal of its temples. Ornamented outside by whitewash and bold stripes of colour, their walls within are covered with designs of demons, dragons and representations of Buddha. Every temple has its great idol, its rich ornaments, and its peculiar rows of candlesticks made of butter and wax, and burning butter; despite which the interior is always filthy, and usually gloomy.

Round the city runs a path, trodden level by the feet of countless pilgrims. This is the famous Lingkor, or Sacred Way; everybody who makes its circuit from left to right is thereby absolved from sin, or at least forgiven a good deal of it. In a city which holds more than 20,000 monks of intriguing mind and unclean manners, such a road seems highly necessary.

CHAPTER II

The Conquest of Roraima

My father, who resided for some years in British Guiana, once met a surveyor there who had just had a singular adventure.

A party, of which he was a member, had been exploring the great forest that covers most of the low coastal plain of that colony; and the surveyor, who was armed with nothing more formidable than the tripod of a theodolite, had got ahead of his companions. He was passing through a glade, flanked by massive trees and dense undergrowth, when suddenly, upon rounding a corner, he came face to face with a gigantic jaguar. The animal stood still within a few feet of the path, looking at him. He had no means of attacking it, and he knew that to turn and run away would be fatal, for wild beasts nearly always pursue that which flees from them. Summoning up all his resolution, he walked on, straight past the jaguar, which never moved. When he had his back to

it he experienced a horrible "creepy" sensation, expecting the great beast to spring upon him from behind at any moment. Fortunately it ignored him, and he escaped.

British Guiana has other adventures to offer, besides encounters with wild beasts of the forest. The numerous Indian tribes who dwell between the brawling mahogany-coloured rivers are only partially civilized, and have many curious customs; some of these people are so primitive that they even manufacture stone tools. Hunters and fishermen all, they catch fish by shooting arrows at them through the water; they also have great skill with the blowpipe, a hollow cane ten or twelve feet long, through which they project poisoned darts at their prey. Unlike the wild men of the vast Amazon forests in the south, these Indians are mostly docile and good-tempered; and it was largely due to their good offices that the following exploit was made possible.

You may never have heard of the Potaro River. It is one of the headwaters of the Essequibo, a brown, swirling stream, sometimes opening out into wide expanses, at others confined between walls of green, and roaring and tumbling over cataracts and falls. Its banks are lined by masses of beautiful water lilies and other aquatic plants, behind which

the densest of forests stretches in impenetrable gloom.

This river forms one of the two chief lines of approach to the famous mountain, Roraima. During recent years it has become almost a tourist route, but matters were very different in the early 'eighties, when the Potaro was uninhabited, except for one or two scattered mission stations and the conical huts of a few half-tamed Indians. At that time the district was controlled by a young magistrate, Everard im Thurn, who possessed a strong natural bent for exploration, together with a passion for botany. To im Thurn the name of Roraima was as the flash of a richly jewelled ring to a diamond merchant. Its inaccessible precipices, its remoteness and difficulty of approach, the legends of mysterious beings dwelling upon it, and the certainty that it would yield him rare plants, fired his imagination and he determined to ascend it.

Roraima had been visited only on six occasions and had never been ascended; in fact, only a year before, a bird collector had looked up at the vertical precipices from their base, and had written that one might ascend the mountain in a balloon, but not otherwise!

Unlike most mountains, this mysterious summit was known to rise like a castle, and

to have a flat top; and as it was by far the highest point either in or near the colony, scientific men were curious to know what conditions prevailed up there, what could be seen from the top, and what plants grew on it. So it happened that, supported by the great botanist, Sir Joseph Hooker, im Thurn was financed by English scientific bodies, and in October, 1884, he started out.

Apart from the leader, the expedition comprised Mr. H. I. Perkins, a Government surveyor, and eighteen Indians, the whole being carried in three large, heavy dug-out canoes, hollowed out of the trunks of trees.

Once away from civilization food becomes exceedingly scarce in the Guiana forests; for the Indians cultivate nothing but the cassava plant, from which they make tapioca, besides yams or sweet potatoes; they are always improvident, having no granaries; and even when there is a surplus of food they are loth to part with it at any price. These circumstances made it necessary to take food supplies for the whole party for three months, which for twenty men meant a heavy load.

The Essequibo runs in from the coast as a wide estuary, with one shore almost out of sight of the other, but it is by no means easy for boats to ascend, because of the numerous

bad cataracts. In the wet season all the rivers rise so high that the cataracts are submerged, and the country far and wide is flooded to a depth of many feet; this offers fresh difficulties, because the streams then run so fiercely, with such whirls, and eddies, and curving-crested waves that one cannot make way against them except in a strong power launch; the absence of camping grounds, also, frequently necessitates sleeping in the boats, and to anyone who has been cramped up all day in a dug-out canoe this is no joke. An accident when the river is low may result in nothing worse than a ducking, but when its uncontrolled flood rolls seaward at its height, anyone unfortunate enough to go overboard would almost certainly be drowned.

These reasons determined im Thurn to start in October, when the rivers were low. For nearly fifty miles the expedition struggled up the Potaro. At shallow places they had to get out and haul the boats over the rocks; at narrows, where the water ran fast, they pulled themselves along by the branches of trees—an unenviable task, for such trees are almost always smothered in vicious, biting ants. Where a cataract occurred, or rocks ran across from shore to shore, the canoes were landed, suitable branches were broken and shaped

into rollers, and on them the heavy craft were tugged overland past the obstruction. Finally, they stopped three miles below the great Kaieteur Waterfall, one of the largest in the world. Here the Potaro gathers itself into a mass about 120 yards wide, and makes a single leap of 722 feet—twice the height of St. Paul's Cathedral—into a great pool; after which it tumbles for another 80 feet down a roaring cataract like an immense weir. *Kaieteur*, by the way, means "Old Man". It is called Old Man Fall because the Indians have a legend that an old man among them who had grown past the stage of usefulness, and was become a burden upon his tribe, was put into a basket and sent to his doom over the fall, a characteristically simple way among savage people of dispensing with Old Age Pensions!

At this point the canoes were beached. The Indians, armed with knives, cut a way through the undergrowth, rollers were fashioned, and they started to pull the boats overland. Unfortunately, the dug-outs proved too heavy for this procedure. One had its bottom ripped out by a projecting tree, and the others also had to be abandoned. The goods were then all manhandled up a slippery and dangerous path to the top of the fall; the Indians carrying their loads on oval frames, tied by a wide band

round the forehead. Throughout this operation could be heard the unceasing roar of the fall, a vast body of water, even though at that time the river was low. Im Thurn, standing on the brink, could discern at his feet nothing but a rolling mist, through which beautiful rainbows played. The backwash from the tumbling water had eaten so far back into the wall of the cliff as to make behind the fall a huge, mysterious black cave; and here, dancing in and out of the sunlight, thousands upon thousands of swallows found a home.

Once on the river above this obstruction, our travellers found two very unhandy canoes, in which they transported themselves and their stores, with the same difficulties as before, for a good stretch towards the mountain, before it became necessary to take to the forest.

Seen from the constant turmoil and movement of the river, with the pitiless glare of a tropical sun overhead, and not an atom of shade anywhere, the entrances to creeks, overlaced by vegetation, quiet, green, and still, were indeed tempting: how much more so then would be the forest, where the giant trunks soared two hundred feet above the ground, and all their tops formed one huge canopy of leaves and branches!

The reality, alas! was very different. The

route now became a mere Indian path, distinguishable only by the saplings which had been bent down so as to blaze a trail. A forest of trunks, immovably still, rose above the travellers, and the undergrowth, except where rare patches of light flickered through, was thorny, the leaves having no green, and hanging dead and withered. Great trailing ropes of orchid roots or other climbing plants, hung down like nets, ready to catch the unwary, and the laden Indians were constantly becoming entangled, every such event necessitating a halt of the whole column. The two white men, lacking the surefootedness of their companions, were compelled to grope their way along, oppressed by the silence and gloom of the place, yet with eyes and ears constantly alert. Unceasing vigilance was demanded for the observation of wild animals or birds, for the avoidance of the unending tangle of roots and treacherous holes. There was, furthermore, the constant risk of treading on a poisonous snake. Spiny branches swung in their faces; masses of slippery wet leaves putrefied the air; and the dull green moss offered a foothold little better than ice. Worst of all was the apparent lack of life, the terrible stillness of the forest.

At convenient openings, where some runnel pursued its tortuous course, its waters stained

brown with organic matter and its banks marked by a heavier undergrowth, the party stopped. Here, as a rule, a little light could be had, though the freshness of day always dwelt far above, and only shafts of sunlight pierced the vegetation, as they would descend through the stained glass windows of a cathedral. Loads were dumped and fires lighted, and at nightfall hammocks were slung to the trees, and a travesty of rest was enjoyed by the party, tormented by mosquitoes, and keenly alive to all the dangers, real and supposed, of the place.

Imagine their relief when, after four days of this gloomy forest, they suddenly emerged upon the open grassy country or savannah, with its rolling flower-covered hills, in bright sunshine, and everything pulsating with joy and life! Now they came upon Indian villages, clusters of beehive-shaped huts, with small patches of cultivation, pigs, dogs, and monkeys. At each there would be a halt, while the copper-skinned, oriental-eyed and long-haired Indians clustered round the white men and held a palaver. At some of these places im Thurn left a portion of his provisions, to be used on the return journey. The Indians are nominally Christians; and they took the opportunity of every halt at a village to pay their devotions—

some of them even "went to church" whenever the fit took them, not a very useful habit in an expedition on the move!

At one place, Konkarmo, the party saw Indians carving axes and ornaments out of the serpentine rock. They first selected a stone that somewhat resembled the object which it was desired to make; and then, chipping it with a knife or a harder stone, they gradually brought it to the requisite outline, afterwards rubbing its surfaces smooth.

The carriers who had brought them thus far now gave way to a party of Arekunas, under a rascally headman nicknamed Arekuna John. These proved good strong fellows, but they were insatiably greedy, coveting everything that the white man possessed. Nevertheless, they served their purpose, by transporting im Thurn, Perkins, and the supplies to Teruta, a permanent village at the foot of the mountain. A day or two earlier a German orchid collector named Siedl had arrived there by way of another river.

They now began to realize the difficulty of the task before them. At the foot of the village ran a stream, at present low, but usually wild and turbulent. Its upper course was in a deep gorge, absolutely choked with trees and shrubs, and this led (to the left, as one faced the moun-

tain) between Roraima and a slightly lower summit, Mt. Kukenam.

The two mountains which were thus separated by the gorge had the aspect of great castles, with none of the splintered peaks so often seen in high summits. Their red sandstone sides sank vertically, just like walls, into the upper part of a dense forest that struggled to maintain a hold on the steep talus slope at the foot of each. Towards the gorge the cliffs overhung, and almost met; yet the narrow slit between them was 2000 feet deep. Streams of water tumbling from the upper parts of both mountains jumped clear down to the forest edge, so sheer was the drop; while the distance was sufficiently great for them to separate into particles, falling as rain. A few misshapen shrubs hung precariously here and there, diversifying the bare red rock; but there was only one way up which anything but an insect could climb. Towards the gorge, where the forest lay densest, a ledge, somewhat resembling the approach up the side of a child's castle, sloped steeply up towards the summit; but its lower part looked very difficult, while above it had been broken away in two or three places, and two-thirds of the way up was a cleft made by a stream of falling water. No other route offered the slightest hope of success.

The first thing to do was to establish themselves as high as possible. Accordingly, they crossed the stream and ascended the hill beneath the forest to a grassy and swampy flat, where they soon established a miniature village of their own. At this place they stayed a month. They built circular huts with clay walls and a pole in the middle; the conical roof of each hut was made from palm leaves, than which there is nothing better in that climate to keep out the rain. As they worked the gigantic cliffs rose menacingly from beyond the forest above them, their upper parts constantly hidden by driving mist; while to men accustomed to the moist heat of the coast every day seemed cold and raw. Each hut had two openings facing one another, but no hole in the roof; and as fires were always burning inside near the hammocks, the smoke speedily made the interior black with soot. This, however, was a blessing in disguise, because it kept off most of the insect pests that love such places.

For some days all was animation in the little camp. While one party of Indians set off to cut a path through the forest to the foot of the ledge, im Thurn and the remainder were out in the vicinity of the camp, usually botanizing; the leader, besides, had the thousand and one

odd jobs that fall to a man when employing savage labour. He also had to supervise his growing collection of plants. Each specimen had to be dried before the fire, otherwise it would have been rapidly covered with mildew in that damp air and spoiled. Every day, as he looked at the mountain, clouds rolled ominously along its top; and the mists, gathering in the gorge between it and Kukenam opposite, seemed to bulge out towards him, as if the evil genii of the place were barring him from the higher regions. Far below, smoke curled up contentedly from the Indian village; all around was a riot of strange and beautiful plants, and in the distance, behind range after range of wooded hills, lay the open savannahs and the plain.

The swamp beside the camp was a wonderful place. Out of the long grass rose masses of rock that had fallen in days before the forest grew, and now were thickly plastered by lichen and moss. The stonier patches bore clumps of heather; the grass hid many curious and beautiful flowers; tree ferns raised their graceful heads twenty to thirty feet above the ground; brilliant climbing orchids, black and yellow, white, pink, and brown, grew in profusion; and in other places were brakes of bamboo—not the ordinary tall, straight stems, but dread-

ful climbers, winding around and entangling everything in their grasp. There were also many of the strange pitcher plants, with their deep green cups, splotted with red, hanging suspended at the ends of the leaves, and ready to entrap any unwary insect that found its way in. Exquisitely coloured little humming birds darted from bush to bush, while in the more watery places wild duck found a home. Flitting everywhere in graceful, sweeping flight, were brilliantly-arrayed butterflies, shimmering like jewels whenever their wings caught the sun.

This was life struggling to survive, with an open space in which to carry on the war. The plants might crowd each other, and some might attain a stranglehold that would only end with the victim's death; but at least all had sunlight and air. Far different was it at the upper edge of the swamp, where palms stood in serried ranks, shoulder to shoulder, not one budging an inch; underneath them a dreadful undergrowth, and hanging from their graceful crowns clusters of orchids, themselves the homes of ants and other creeping things. Still worse was it in the dark recesses of the forest, where a continual struggle for life and death went on, between the crowded palms against one another, and against the strangling climbers. Nothing but the sharpest of knives could avail



E 281

RORAIMA

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the path-cutters against such a riot of vegetation.

The trail through the forest was as steep as an average hill road. Beyond it the slope increased till it equalled that of a roof. It was also incredibly rough, owing to gigantic blocks that had fallen from above, and under and around which the explorers had to scramble as best they could. All the boulders, as well as every inch of ground, lay hidden beneath a dull green mantle of sopping wet moss, which even overspread the surface of pools of water with its treacherous coat, and into which one constantly stepped without warning, with much wrenching of muscles, splashing and general discomfort.

Beyond this not very cheerful place stretched a belt of blackberry bushes and bracken, the latter with its peculiar odour, and both of them strongly reminiscent of home. Immediately behind them, straight as a wall, rose the vertical side of the mountain.

On 14th December, the path to the ledge being ready, im Thurn started to ascend, accompanied by a few of the flat-nosed, long-haired Red Indians. For the work of men unused to instruments, the path was wonderfully straight, but it proved by no means easy for the white man to follow; because the

Indian walks in the forest with his feet straight in front of one another, so as to form a single narrow line, and naturally he cuts away no more undergrowth than is necessary. Hence, the unfortunate Englishman was constantly slipping on the glassy leaves, or tripping over roots, or being caught up by treacherous trailing climbers. When one adds to this the constant whipping back of prickly shrubs, the spiny armour of the massed palm leaves, the inevitable stings from swarms of insects, the steep gradient, and the sepulchral gloom and fetid smell, one obtains a picture that is somewhat discouraging.

As they advanced the way grew steeper, and chunks of earth and moss that had perforce to be seized as handholds not only squirted water up one's arms, but came away in the fingers, and left one awkwardly poised on the toes, trembling on the verge of a fall among the palm needles.

For two hours they slowly penetrated into this wilderness, the light fading rapidly, and wisps of mist curling around the half-hidden trunks. When at length they emerged from the forest, into a chaos of fallen rocks, the mist rolled down upon them shutting out everything. They felt the cold severely; it was impossible to make the ascent without a

fuller reconnaissance at close quarters; and im Thurn gave the order to return.

There ensued three inactive days, during which rain and fog enshrouded the little camp, and our explorer and his surveyor kept within their hut, drying plants and whiling away the time. Throughout this period the gorge remained invisible, while overhead, far down the cliffs of Roraima, grey clouds lowered, as if they would burst upon the huts and destroy them at any instant. Eventually, however, a fine day came. The sun shone once more, and his rays scintillated on the backs of the humming birds. With happy hearts the little party assembled, rapidly made the traverse of the forest, crossed the talus to the foot of the ledge, and began the attack on Roraima in earnest.

Climbing over the rough lower ground, with its broken rocks and its tangled brambles, and keeping close to the outer or cliff edge, they steadily rose along the ledge until they were more than a thousand feet above the tree-tops, and had a wonderful view of the forest below. At this point the ledge fell away abruptly, but on approaching the edge, they found that a natural hollow had been worn in the cliff by the fall of a stream which, tumbling over the cliff above, fell as fine spray on their heads. By an easy slope it was possible

to get down beneath the fall, and to pass across to the other side, beyond which the prospect seemed more doubtful.

Descending into the hollow, they were immediately lost to one another in grass more than six feet high. On emerging from this, they had to glissade over the slippery, water-soaked, moss-covered rocks beneath the fall, avoiding the softest patches, and then to climb a very steep, greasy hill to the ledge again. Had there been much water coming down, this would have been impossible.

Once on the ledge again, the rest proved easy. The way up was twenty feet wide, and covered with curious plants. One in particular, a *Brochinia*, had its leaves so arranged as to resemble cups, holding large quantities of water; and over masses of this plant they went, squelching in the wet continuously. Another plant, rosette-shaped, had long needle-like spines which were reputed to be poisonous, and were accordingly treated with much respect. There were also patches of heather with beautiful dark green leaves and brilliant crimson flowers, besides large pitcher plants and other strange things.

A short climb, an involuntary catching of the breath, and the top of the mysterious mountain was theirs. What would they find there?

The Conquest of Roraima 69

The reality surpassed anything that they could have imagined. The top was not flat at all. A sandstone wilderness, 8600 feet above the sea, it had been played upon for ages by wind and rain, and had been worn into the most extraordinary formations, some of them far larger than a house. Here was a church, complete with stumpy steeple; there an overlapping mass that looked like nothing more than a huge mushroom. The fancy saw in other curious rocks resemblances to animals, houses, castles; but all was absolutely barren, except for a few stunted bushes in sheltered spots. Between the rock masses stretched little sandy plains, rivulets of water, tiny cascades, and miniature lakes. Over all there hung a mysterious stillness, as of death; only the tinkle of the water and the remote sigh of the wind broke the silence. A mist, which never seemed far away, wrapped first one and then another of these curious rocks in its cold embrace, giving to the whole place a sense of vastness and desolation. So huge was this plateau that the party could not possibly explore more than a fraction of it, nor did they dare to go far, for nothing would have been easier than to have been lost there completely.

After boiling water to find the height of the summit, and collecting specimens of the few

plants which were visible, im Thurn returned to his camp. Shortly afterwards it was broken up, and thanks to the dépôts which had been laid by his forethought when going out, the return journey to the coast was made easily, and without incident.

Upon arrival in civilization, however, im Thurn became seriously ill, as a result of the hardships which had to be endured on this trip; but he recovered, to live for many years in the somewhat enervating heat of British Guiana, to be knighted, and to do yeoman service in other parts of the British Empire.

CHAPTER III

Sir John Murray, and the Bottom of the Sea

Just ninety years ago there was born at Coburg, Ontario, a boy who was destined to have an enormous influence upon certain branches of natural science; his name, John Murray, is a sufficient indication of his ancestry. At the age of seventeen he was sent to relatives in Scotland, where he studied at Edinburgh University. Short, thickset and strong, young Murray had imbibed from childhood a contempt for regular or orthodox studies, and examinations meant nothing to him, so that he never entered for them. He was, however, industrious at whatever subject caught his fancy; and his clear thinking and original views made him a notable figure in New Athens. On and off he spent the fifteen years, until his thirty-second birthday, at the University, without, however, becoming one of the recognized staff.

At this period—in the early 'seventies—it was beginning to be realized that beneath the

restless surface of the sea dwelt a vast marine population in an almost wholly unknown world. The first Atlantic cable had been laid (from Valentia Island to Newfoundland) in the year of the Indian Mutiny; and new lines were now being projected between many places. In order to lay the cables successfully it was essential to have some idea of the submarine relief, as well as of the nature of the bottom; but at that time such information was available only for the merest fraction of the ocean. Recent expeditions, and especially three small cruises by the *Lightning* and *Porcupine* in 1869-70, had shown that a strange and wholly unexpected fauna dwelt in the sea; and this scientific novelty whetted the curiosity which commercial motives had aroused. The United States contemplated a large-scale expedition to study the sea; the French and Germans were also busy; and to cut a long story short, the British Government decided to take the lead by sending the *Challenger*, a steam corvette of 2300 tons, with a naval crew and officers, and carrying civilian naturalists on board, upon a three years' survey of the ocean depths.

Thus was this famous cruise initiated. The ship was commanded by Captain (Sir) George Nares. The chief naturalist was Professor Wyville Thomson, of Edinburgh University.

He had five assistants: the last place, becoming vacant by chance, was offered to John Murray, who thus had his life's work thrust upon him.

Besides ascertaining depths and currents the vessel was to visit remote islands, to collect plants and birds, to make hourly meteorological observations, and to glean all sorts of useful scientific knowledge.

Seeking for what lies within the sea is like reaching out one's hand for a thimble on the floor of a swimming bath which is filled with ink. Chance plays a great part in every capture, for nothing can be discerned until, by some means or other, it has been brought to the surface.

The first and most important point was sounding. It would appear to be the easiest thing in the world to sling a line and weight overboard, and to measure its length when it reached the bottom. In practice, however, it was learned that currents drifted the line away, even though the ship was held stationary, for at various depths in the sea are currents which often run quite contrary to one another. Thus, it was never certain when the bottom had been reached, and sometimes many miles of line were actually paid out without finding it simply because a current had got hold of the rope.

To remedy this state of affairs Midshipman

Brooke, of the U.S. Navy, invented a sounder, to which was attached a weight that was released only when it hit the bottom; while in England, Sir William Thomson (afterwards Lord Kelvin) devised a machine with a brake, which so worked that the line slackened immediately the sounder touched ground. The sounder always comprised a tube in which a sample of mud could be caught and brought to the surface. Various modifications of the Kelvin apparatus have since been made, by Sigsbee, Lucas, and others, but the principle remains unchanged.

Then again, it was very desirable to know how the inhabitants of this marine realm lived. Imagine a world of water, most of which is three miles or more high (i.e. deep), and in which multitudes of animals dwell, mostly at the top but some at intermediate levels, some just above the bottom, and some on the bottom. Do they all live under the same conditions? Is there any light down there? If not, how do they find their way about? All these and other fascinating questions were awaiting an answer when the *Challenger* sailed.

Thus, it was necessary not only to sound, but also to pick up samples of sea water from the bottom and from intermediate depths, in order to learn what impurities and gases (especially oxygen) they contained. This was

done by means of a stopcock water-bottle, which went down open, but automatically closed on being jerked upwards, thereby entrapping a little water from the appropriate level. The sample was afterwards analysed on board the ship. Special thermometers of various kinds were also employed for ascertaining the temperature at all levels.

Finally came the inhabitants of the sea. It was by no means certain that anything lived at very great depths; but for the capture of such bottom-living creatures as might exist dredges and trawls were used. These appliances were much larger than the ordinary apparatus with which young naturalists explore the sea-bed near land; for instance, the trawl had a beam 15 to 20 feet long, made of stout wood, the edge of the large net below being weighted with many small rolls of lead.

For examining shallow depths and the surface water tow-nets were hung out, generally at night. When hauled in they contained a mass of uninviting jelly, but what treasures for the microscope were revealed when this was sorted!—young fish in many stages of development, exquisitely beautiful animalcules, diatoms and other plants, and a whole host of extraordinary creatures, so minute that individually they escaped detection in the clear water!

The expedition left Sheerness on 7th December, 1872. Everything being new to them, they were some time in acquiring skill at operating the plant, not to mention the difficulty of accustoming themselves to work upon a rolling vessel in mid-winter. The start, indeed, was distinctly inauspicious. At their first sounding (in the Bay of Biscay) they lost the line, together with a thermometer. At the first dredging the dredge came up empty. The second sounding cost them another line and thermometer. They then fouled the dredge on something, and lost that. Finally, the third sounding also resulted in the loss of everything. After this matters improved; and eventually they became sufficiently skilful to sound in all weathers, and to take dredgings in any but very heavy swells.

The *Challenger* sailed via Lisbon to Madeira and then to the great volcano of Teneriffe, a huge mountain that is one-third buried under the sea: here the main work was to commence. The essential part of the programme was to make soundings at least once a day.

Sounding took a considerable time, and was usually done early in the morning. For the most part the ship cruised under sail; but in order not to change her position during sounding steam had to be got up each day. The

heavy line, with its thermometers, water-bottles and weights, was lowered at 5.30 to 6.0 a.m.; and if the depth happened to be 2 or 2½ miles the sounding took about an hour.

Later, if conditions were favourable—that is, if the ship were not rolling so that her decks stood at all angles to the horizon—the dredge or trawl was got out, with a long iron bar behind the bag, to which several coarse swabs were attached, so as to entangle any rough or spinous creatures. Being slung out about 200 yards behind a heavy weight the apparatus was slowly sunk to the bottom, and a large amount of slack rope paid out. The ship then drifted for a time; after which the whole outfit was slowly and carefully hauled in. Despite all precautions it often came to the surface upside down and empty, while it sometimes caught on rough obstructions on the bottom, or became entangled with the weights, and was lost.

The first hauls with the dredge were very disappointing. They brought up great masses of sticky clay, all of which had to be carefully washed through a sieve in order to discover whether it concealed any living thing; and the result of a whole afternoon's work would be a few deep-sea shrimps, an occasional curiosity like a new type of sponge, and some fragmentary worms!

Subsequently they used the trawl (which sweeps the bottom much more lightly than a dredge), and the character of the catches improved.

You can imagine the interest with which the early haulings-in was watched: the strain on the rubber accumulators, the dripping rope winding round the capstan, the appearance of the frame at the surface, the sigh of relief with which it was seen to clear the water (always a risky moment, because the apparatus then doubles its weight), and its lowering on deck, the haste to undo it, and the care to prevent small crabs and other nuisances from running all over the ship! Once or twice during the voyage they had the most cruel of setbacks, the net and its contents just appearing awash, only for the rope to part and the whole lot gracefully sink out of sight again! It was declared that the rarest and most valuable organisms were in these lost dredgings! As time passed, however, and the novelty of the work wore off, the interested spectators dwindled to nil, only those attending whose special business it was; but Wyville Thomson, who retained his keenness throughout the three and a half years' cruise, never missed a dredging.

Of course, one cannot hope with dredge or trawl to catch large marine animals, except by

the greatest good luck, and fishes, in particular, nearly always get away; so much so that it became a joke among the *Challenger's* crew that the naturalists could catch everything but a square meal! When off Nova Scotia, however, they made a rich haul of delicious cod, which to some extent compensated for their former deficiencies.

Off Cape St. Vincent they caught their first deep-sea fish—a rat-tailed, triangular little object, only a few inches long, and in a pitiful condition. At the bottom of the sea all animals necessarily live under the pressure of the overlying water, a block of which one square foot in area and one foot deep weighs about 64 lbs.; the immense pressure compresses the gases in the creatures' bodies. When this fish came up, the expansion of its gases resulting from the removal of the pressure had blown its eyes nearly out of its head, and had forced its internal organs out through the mouth. Later captures were generally in a similar condition: only rarely were they even presentable, and very few indeed were fit for museum specimens. On the other hand the sponges, sea cucumbers, deep-sea corals, deep-sea shrimps, even the delicate worms that dwelt in the utter darkness two or three miles, or even more, beneath the surface, werè largely perfect. As a rule, how-

ever, owing to the reduced pressure, they either died on the way up, or could not be kept alive more than a few hours.

After staying a week at Gibraltar, the *Challenger* went to Madeira, and then to the noble volcanic island of Teneriffe, where the intention was to climb the peak, collecting its plants, while a pinnace sounded the shoals round the island. Owing to the early season this project fell through. Like many another oceanic volcano Teneriffe is partly buried under the sea; for although its exposed portion soars grandly into the sky for more than 12,000 feet, its roots go down beneath the waves for another mile and a half; so that, could we but remove the water, what an awe-inspiring mass this would be!

From Teneriffe the expedition crossed the Atlantic to the West Indies, on a course where ordinary ships never sailed, and meeting no other vessels—sometimes not even seeing a bird—for days at a time. They passed through the Sargasso Sea, which is commonly imagined by young people to be a stretch of slimy, still water, where deserted hulks lie rotting, their chains rusted away, their timbers covered with weeds, crabs and barnacles; here, pirates might conceivably have their lair. Alas for this pleasant fiction. The Sargasso Sea is two to three miles deep; and is simply a large oval

part of the ocean around which currents sweep in curves, sloughing into it masses of *Sargasso Weed* that grew originally in the Gulf of Mexico. The seaweed collects into patches of yellowish-brown, from a square yard up to an acre in area; and upon it, as well as beneath its sheltering fronds, a great number of small oceanic animals make their homes. Lanes of water of the richest blue separate these floating islands.

Murray was sent out in a boat to examine the weed. Encrusting organisms marked it with white patches, and all the animals dwelling on it simulated the same colours, especially a tiny crab which so perfectly resembled the weed that it could be detected only when it moved. Murray took one of these crabs, placing it in a different position several times; on each occasion it returned to its original site, as if conscious that there alone lay safety. Here they also found one of the very few fishes that make a nest—a little thing, of extraordinary shape and markings, called *Antennarius*. The nests, which contained the eggs, were round, resembling cricket balls, and were composed of threads manufactured by the fish.

In this part of the ocean the *Challenger* people had a remarkable proof of the great pressure at the bottom; for even from a depth of less than $2\frac{1}{2}$ miles the trawl came up with

its beam twisted, the wood being compressed by half an inch, so that the knots stood out beyond the general surface.

The West Indian coral reefs, especially those of Bermuda, gave the naturalists their first taste of the beauties of a tropical sea. Armed with a water-glass (which is simply a plain tube, to shut off a portion of the surface water and stop it from moving) one could see the bottom clearly, even at a fair depth; and the many kinds of corals—some knobby, with green, brown, and red polyps, some whiplike and iridescent, some like beautiful jewelled fans swaying with the tide—formed an exquisite picture. In and out among the waving shapes darted crowds of gaily-hued little fishes, many of which fed on the corals; large helmet shells, tiger shells, and others, all arrayed in gorgeous coats of many colours, nestled in the crevices or crawled slowly about among the weeds; cream, terracotta, red, green, speckled and banded sea anemones, the flowers of the ocean, completed the picture. The water had almost the green hue of a swimming bath, except that it was marked by ominous dark purple patches where the reefs rose. Farther out one might discern the fin of a shark, or be startled by a sudden splash as flying fishes leaped out of the water to escape pursuit, perchance only to

fall straight into the waiting jaws of another foe. Falling like stones from the blue, fishing-birds dropped straight as a plummet into the water, presently to emerge dripping, with fishes in their beaks.

At all the islands on her route the *Challenger* stopped, while botanical and bird collections were made, ceremonial visits undergone, and a little welcome exercise enjoyed after the long spells of rolling ocean. Meantime, the pinnacle dredged and trawled in shallow water, usually with Murray in charge.

From Bermuda the ship sailed north to Halifax, Nova Scotia, and back again, during which time they crossed the Gulf Stream on several occasions. The Gulf Stream is like a river of very salt water, running in the ocean, and at times its deep-blue colour marks it off from the inshore seas with wonderful abruptness. It runs at from one to four miles an hour; and in this connexion the voyagers had a singular experience. The ship hove-to for a sounding; but so strong was the current that she had to steam against it at a corresponding rate in order to maintain her position, and while the vessel did not move the water rushed by her like a river.

The difference in warmth and saltness between the Gulf Stream and the adjoining

seas is fatal to many creatures every year; for the Stream, having no banks, alters its position at the will of the winds and barometric pressure. Such a phenomenon apparently caused an extraordinary destruction of tile-fish a few years after the *Challenger's* cruise, when millions of dead and dying fish lay scattered over the surface for hundreds of square miles.

From Bermuda the *Challenger* went east again to the Azores and Madeira, then southwards across the Equator. Off the Canary Islands they encountered some very extraordinary polyp animals, of which the Portuguese Man-of-War is the type. They are gelatinous, with a float composed of one or more air-filled chambers, beneath which is an arrangement of swimming-bells. The float is usually at or near the surface. Underneath it there trails a greater or less extent of "fishing line" comprising long serpentine threads, each armed with a feeding polyp, and with thousands of stinging cells that can severely injure even a man. The threads vary in length from a few inches to fifty feet, or even more; the larger ones are among the greatest dangers of the ocean. Serenely the animal floats along, dragging its deadly tangle behind it, and woe betide the small fish or other prey that comes within touch of the countless stings!

Stopping to examine St. Paul's Rocks, a tiny bit of land in mid-ocean, barely above the spray, and largely made up of guano, they next made sail for Fernando Noronha, a grim rocky penal settlement off the Brazilian coast. Here they found the convicts enjoying great liberty, tilling their own gardens, and forced only to supply a certain proportion of labour to the government; while the governor of the place rested secure in the certainty that none could escape. He was a surly man who forbade our naturalists to make collections, and since that had been the object of their call, they got under way once more for Pernambuco, and then passed down the South American coast to Bahia.

In this stretch they met their first sperm whale, the true lord of the sea. Sperm whales wander about in pairs, or even singly, and are feared and dreaded by sharks and even by their pugnacious smaller relatives, the Grampus, or Killer-whales, which they will toss in the air with one grand sweep of the mighty tail, and dexterously bite in two as they descend. Certain sharks, however, combine in packs like wolves to attack them, and then it may go hard with the whale; even this greatest of animals is not immune from a violent death. Moreover, every whale carries about with it

such minor inconveniences as clusters of barnacles and other growths; many of them are also infested by more unpleasant parasites.

Sharks are among the few large creatures to be found far out at sea; where they wander other fishes speedily make themselves scarce. The *Challenger* repeatedly caught sharks to which sucker-fish were attached; small brown creatures, they had the dorsal fin modified into a sucking pad on top of the head. They hung on to the shark upside down, doubtless getting a certain proportion of its victims; and so tenacious was their hold that they suffered themselves to be drawn out of the water along with the expiring monster.

The naturalists also noticed a turtle swimming boldly in the open ocean, 300 miles from the nearest land.

They were greatly charmed by the frequent appearance of phosphorescence at night, in this and other tropical seas. It was very largely caused by *Pyrosoma*, a jelly-like organism, which emits a brilliant blue or green light. One huge specimen, four feet long, was placed in a tank; a naturalist wrote his name on its side with his finger, the letters glowing like blue fire for nearly half an hour afterwards.

Many other marine creatures possess these natural lights, especially deep-sea fishes, which

have on their sides regular patterns that one may fancifully compare to the portholes of a liner. The lights are of different colours and patterns, according to the fish. Sunlight penetrates but a very short way beneath the surface, the great bulk of the ocean being continuously dark. By means of its luminosity the deep-sea fish can distinguish friend from foe, can light up the sea-floor, and can attract its prey. Some even have the front fin modified into a luminous feather, which waves in front of the head after the manner of an angler-fish's bait; suddenly the great mouth-slit will close cruelly upon the victim whose curiosity has been aroused by the light. Most of these deep-sea fishes are peculiarly hideous, having either no eyes or extraordinarily large ones; while their teeth are prominent and incurving. There is so much difficulty in catching prey that no chance must be left of its wriggling away, once it is between the ferocious jaws!

When near Bahia the *Challenger* had the unusual experience of a shower of butterflies, pretty little things, all of one kind, and so numerous as to resemble a snowstorm. But what a nasty, sickly mess they made when their multitudinous bodies covered the decks, and were involuntarily trodden underfoot! Such showers are not uncommon in this region, the

young butterflies being caught by a land wind when on the wing, and blown offshore; scarcely any survive to return with the evening breeze.

After they had remained some time at Bahia one of the seamen contracted yellow fever, so the ship made a hasty departure, leaving him behind. Minor fevers broke out on board, but fortunately they were soon dispersed; and the ship again had a clean bill of health when she reached her next halting-place, the lonely island of Tristan d'Acunha. Here the *Challenger* people learned of two Germans who had led a most extraordinary life, and it was resolved to take them back to civilization. This is the story, as Sir Wyville Thomson tells it.

They were brothers, by name Frederick and Gustav Stoltenhoff. Gustav (the younger) was a sailor whose ship caught fire and sank near Tristan d'Acunha some years before; and he, with one boatload of survivors, was well treated by the islanders until a ship took them home.

He had learned that Inaccessible Island, a rock about 100 miles from Tristan, was a good breeding ground for seals, and he determined to go back and exploit the knowledge. On reaching Germany he found his brother newly discharged from the Franco-German War, out of work, and ready for adventure. Accordingly they got themselves conveyed to the South

Atlantic, and were dumped down on Inaccessible Island rather more than two years before the *Challenger* visited it.

They were typically German in their thoroughness. Their equipment included an old whaleboat, with mast, sails, and oars. They took three spars to make a roof for a house, a door, and a glazed window. They had a wheelbarrow, two spades, a few other useful tools, a kettle and a frying pan, crockery, blankets, a lamp, and six dozen boxes of Bryant and May's matches. For food they took 200 lbs. of flour, the same of rice, half as much biscuit, 20 lbs. of coffee, 10 lbs. of tea, sugar, salt, pepper, tobacco, wine, gin; two guns with ammunition were intended to provide them with fresh meat. They also had sheath knives, seeds of vegetables, seed potatoes, and a few books, and with this equipment they started their Crusoe-like career.

At first the inhabitants of Tristan, who themselves went sealing on Inaccessible Island, helped the adventurers. The Germans erected their hut in a cove that was sheltered from the wind, but wholly enclosed by cliffs; one could, however, climb up to the plateau which formed most of the island, by hanging on to the tufts of coarse tussock grass. Up there a number of wild pigs and a few goats roamed,

and these were killed indiscriminately by the brothers Stoltenhoff and the Tristan people, as need arose.

The brothers killed a few seals, but had no means of extracting much of the oil. After a few months the boat was accidentally damaged; so they cut her in two, and used the worse half to patch up the better. During the winter they shot a few goats and pigs, on which they lived, together with their supplies.

Life now became much harder for them. After they had been on the island six months they accidentally set fire to the tussock grass in the cove; it flared up and was destroyed, and with it went their only means of getting out of the cove by land. The patched boat, too, went to pieces in the rough surf, so that whenever they wanted to leave their home they had to swim. During that winter they were half starved, besides suffering much from the lack of variety in their food.

The next summer the Tristan men, who probably resented their long stay, set bounds to its duration by killing all the remaining goats, and during the second winter the two brothers had an even harder time. Forced to swim whenever they wanted meat, they decided to move; but in doing so many things were perforce left behind in the cove. A ship

appeared at last, but unfortunately, at about that time a swarm of penguins settled on the island and the brothers refused the offer to take them off, being sanguine enough to think that they could live on penguin eggs while their prospective fortune in seals accumulated. Naturally, the result was that when the *Challenger* people picked them up they were mere skin and bone, and heartily glad they were to see the last of Inaccessible Island.

Pursuing her leisurely course to Cape Town, the *Challenger* arrived there just a year and ten days after her departure from England. She was crowded with captures made by dredge, trawl, and tow-net, besides plants, birds, and other specimens. It fell to Murray's lot to catalogue these, with all the careful marking so necessary in order that they should not become mixed; and while the ship was at Cape Town he packed up the collections, in sixty-four large cases, and they were sent home. He must have felt a thrill, at times, in thus handling one by one all the precious results of their many hauls.

From South Africa the expedition was destined to wander over the vast, lonely and constantly stormy Southern Ocean, before doubling back upon Australia. The ship touched at several lonely, cold and uninhabited islands—Marion Island, the Crozets, and Kerguelen.

In these seas life was more prolific even than in the tropics; but of course it was of a different kind, and it furnished them with many an interesting capture and still more interesting discussion.

At Kerguelen, in particular, they secured large numbers of sea spiders—extraordinary animals, not in any way related to ordinary spiders, but somewhat resembling them externally, having the same small bodies and immense legs. Some of these ugly creatures measured two feet across.

Soon after leaving Kerguelen the lookout shouted "Ice ahead!" and everyone rushed to the rail to see. There before them floated a huge tabular iceberg, glittering coldly in the pale blue southern sky, with deep blue and green hollows where caves or fractures lay, a glorious but menacing picture. It was more than 200 feet high and nearly half a mile long. Bergs of this kind soon became a common sight, and dozens were frequently visible at once. Numerous whales also appeared, including the large finback whale, which congregates in thousands in Antarctic waters.

The *Challenger* crossed the Antarctic Circle, but was soon forced aside by the edge of the pack—a vast expanse of grinding, pancake-like ice floes, which stretches between the stormy

ocean on the north and the smaller areas of open water near Antarctica. Throughout this part of the voyage the dredgings revealed a wonderful abundance of living things; the life, however, was sometimes more prolific than agreeable. For example, some patches of sea were almost brown with a slimy evil-smelling scum: on examination, it proved to be the decomposing bodies of countless millions of diatoms, those tiny plants whose pillbox skeletons form such exquisite objects for the microscope.

On leaving the Antarctic the expedition made for the more genial climate first of Melbourne, and then of Sydney; and at Sydney they had their first real leave, staying there three months. Meanwhile all the Antarctic collections were packed up and sent home; a job that must have taken Murray a considerable time, for they fully equalled those collected during a whole year in the Atlantic.

The greater part of the long cruise, involving continuous and exhausting work, now took place in the tropical and sub-tropical Pacific. From Sydney they went to New Zealand, then to Tonga and Fiji, and back again to Torres Straits: so prolific was the life at the last-named that over 500 different *kinds* of animals were collected there in two days. Thence they passed to the Philippine Islands and Hong

Kong. Murray had now again to pack all the collections—an array fully equal to the total amount sent home hitherto, much of which was entirely new to science.

The monotony of their work under the hot tropical sun told upon them all; nor had they any encouragement but their enthusiasm and sense of duty; the oily sea, the occasional storms, the rare flights of birds, making a background which, beautiful in itself, palled because it was always the same. Occasionally something curious happened, however. Thus, one day a flying fish, eager to escape pursuit, shot out of the water and straight through a porthole into the *Challenger*, where, of course, it was speedily bottled. At another time, when 74 miles from land, and in water $1\frac{1}{2}$ miles deep, they fished up some coconuts from the bottom; their insides were mostly occupied by small shells, but one was still white and fresh. This freak capture reminds me that another famous oceanic naturalist, Agassiz, once pulled up a dredge from deep water off New York with great skill and caution, as it contained a load, and on sifting the mud found that the precious content was—an old boot!

From Hong Kong the *Challenger* sailed back again to the Philippines and New Guinea, then north to Japan, and at this time she made

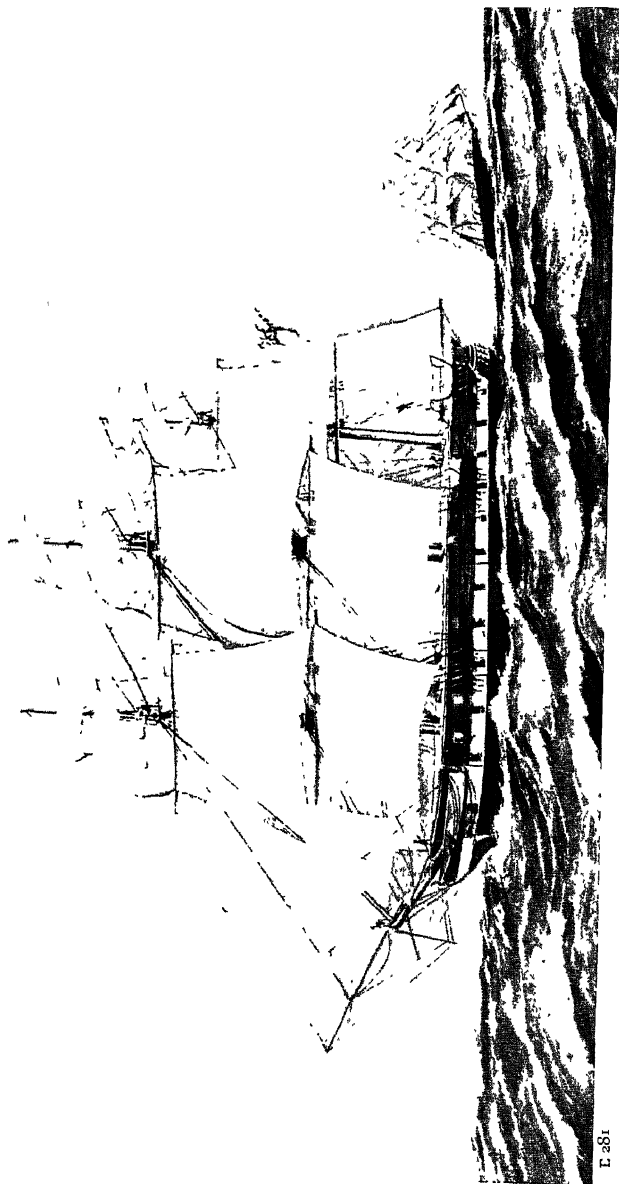
her deepest sounding, more than five miles; the pressure at the bottom was so severe that the thermometers were all broken. At such a depth the pressure is about 900 times that under which we live, and yet the softest of animals not only endure it, but appear to thrive in it. At great depths the number of specimens was always fewer, but their variety was surprisingly great—red and black shrimps, numerous extraordinary fishes, some extremely fine sponges, strange worms and other things.

From Japan the expedition crossed the vast bosom of the Pacific, by way of Hawaii and Tahiti to Valparaiso. During this time Murray developed an interesting theory on the origin of coral reefs, which created much attention for some years, but is not held of great account now. A serious blow at this time was the death, from erysipelas in the face, of Willemoes-Suhm, one of the naturalists. He was a popular and industrious young man of much promise, who had won his way into the hearts of all on board.

Shortly after he died the ship dredged in extremely deep water, and brought up whole loads of whales' earbones and the teeth of sharks; the latter, in particular, were of very ancient types, looking as if they might have belonged to fishes that swam in the Pacific ages ago.

Before leaving the Pacific they called at Juan Fernandez, Robinson Crusoe's island; and then, instead of passing round Cape Horn into the Atlantic, threaded a way among the Chilian islands, past the sombre mainland forests and the savage bays where glaciers stole down to the water's edge, and so bore round to the Falkland Islands and the broad ocean that led home. Every day now added to the congestion on board; but every day, almost without a break, the work went on until they were in the North Atlantic once more, and home became a thing to talk about. Violent storms delayed them considerably, but at last the good ship sighted the Needles, and passed up to Portsmouth on 24th May, 1876, just $3\frac{1}{2}$ years after setting forth. She had covered no fewer than 68,890 miles.

The real work of the *Challenger* expedition now began. All the hundreds of cases, with their thousands of jars and dried specimens, had been temporarily stored in Edinburgh. A government office was opened there, under Sir Wyville Thomson, with Murray as his assistant, and here the collections were unpacked and sorted. The out-turning provided them with many an anecdote, as the removal of sawdust and shavings revealed first one curiosity and then another, each a reminder of some far-off sea.



H.M.S. CHALLENGER

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It was early realized that the collections would take much time and many hands to examine thoroughly. Unhappily, Thomson fell ill shortly after the return of the *Challenger*, and never really recovering, died in March, 1882.

Meantime, Murray had succeeded him as Editor of the *Challenger* Reports. He allocated the groups of animals to different naturalists; examined the drawings that were intended for publication (for several figures were required of each species, as a rule); read the immense manuscripts; and by his natural energy pushed the great work forward as fast as he could. At last all the results were published in forty-eight large volumes, the work of seventy-six different scientists, and of a host of artists. This was in 1891. The long delay, the consequent loss of public interest, and a passing phase of economy, forced the Government (who had already spent nearly £190,000 on the *Challenger* cruise and its aftermath) to refuse to publish what Murray considered as essential, a summary of the whole; so, characteristically, he threatened to do it out of his own pocket. A compromise was arranged at the last moment; and two final volumes, containing an invaluable summary of the work, were published in 1895. The story was complete.

Murray (who was made an LL.D. and

F.R.S., and was subsequently knighted) himself created one entirely new science, that of deep-sea deposits. All the hundreds of samples of the bottom, together with many collected by other expeditions, were analysed and microscopically examined by him, in conjunction with his friends Robert Irvine and Professor Renard, and the results noted down by his assistant James Chumley; and it was now shown for the first time that the ocean bed was composed of several different kinds of deposits: in intermediate depths ooze made up almost wholly of countless microscopic shells from the surface, and in great depths featureless plains of red clay.

Long before the editing of the *Challenger* Reports was completed, Murray's love of the sea had found another outlet. He made two small expeditions to the north-west of Scotland, proving the existence of a buried ridge separating the deep, cold Norwegian Sea from the warmer North Atlantic: this, the Wyville Thomson Ridge, owed its discovery to the man whose name it bears, and who, too ill to participate in the work, watched the ship depart from the Shetland Islands.

Later Murray acquired a small yacht in which he cruised and dredged among the Scottish sea lochs. He also built a floating laboratory

upon an old canal barge, which was aptly named the Ark, and which was anchored in a picturesque little quarry on the Firth of Forth, flooded at high tides. Far more important work was to come.

Among the Antarctic dredgings of the *Challenger* were certain rocks which only occur on continents, and this led Murray to postulate the existence of an Antarctic continent, although at that time nothing whatever was known definitely about it. He started the rolling of the ball of inquiry by a paper read before the Royal Geographical Society. Sir Clements Markham, subsequently President of the Society, took up the matter with enthusiasm; and there eventually resulted another great national expedition, that of the *Discovery*, under Captain Scott. During her long sojourn in the Antarctic large areas of the continent were visited for the first time. A little earlier the same impulse had directed other ships to South Georgia and the South Shetlands, one of which resulted in the loss of the vessel.

During this period of his life Murray's energy was inexhaustible. This man, who in his youth had been unable to concentrate sufficiently on anything to qualify for a degree, successfully carried through one of the most tedious jobs imaginable: he divided the whole

ocean surface into small squares, each of two degrees, and by collecting thousands of observations which had been made for nearly half a century by many ships, he made the first real temperature charts of the sea.

Meanwhile honours showered upon him, but he seemed to care but little for them, and throughout remained the same blunt, uncompromising, hardheaded Scot.

In 1897 he began a project that had long been fermenting, no less than a survey of all the 567 principal Scottish lochs; sounding their depths (which sometimes reach far below sea-level) and making many other observations. This work was carried steadily through to its completion in 1909. The highlands are by no means constantly kind in the nature of the weather they dispense amongst the lochs; but were it fair or foul Murray was to be found on one of them, along with his friend Mr. F. P. Pullar, armed with water-bottles, a portable Lucas sounding machine, samples of the bottom, and collections of the living things. His first coadjutor in the work, Mr. Laurence Pullar, sacrificed his life in trying to save another person, and was drowned. Such were the types of people by whom Murray was surrounded, and on whom he exercised such a notable influence.

In later years his mind constantly wandered back to the Pacific, where he projected another expedition, but the great expense as constantly prohibited it. However, in 1910, he made arrangements with the Norwegian Government to lend him the *Michael Sars*, a fisheries steamer of only 226 tons, under Captain J. Hjort, and in this small craft they not only traversed the length and breadth of the North Atlantic for four months, but made exceedingly valuable researches, trawlings and current observations. One great aim of the expedition was to prove the existence of life in the intermediate depths of the sea; and this was done by means of nets towed at different levels down to about two miles, as many as ten nets being successfully carried on a single line. The results of the expedition came out in 1912, in a fascinating volume, *The Depths of the Ocean*. Murray was now in his seventieth year; a pretty good age at which to subject oneself to the buffetings of the stormy Atlantic.

He remained hardy and alert to the end, being killed instantaneously in a motor-car accident, on 16th March, 1914. He was in his seventy-fourth year.

One of the strangest inhabitants of that realm which Murray searched so often and so successfully is the Giant Cuttlefish, a horrid,

cartilaginous mass, generally resembling a huge octopus, but having, in addition to its eight ordinary "arms", two long tentacles, capable of contraction, and bearing at their ends thick pads armed with suckers and vicious hooks. These tentacles alone may be thirty feet long, or even more—i.e. equal to the height of a suburban house; while the monster's ordinary "arms" are eight or ten feet long, and its sac-like body adds another six or eight feet.

The Giant Cuttlefish is sufficiently powerful to prey upon all marine animals other than dolphins and porpoises, large sharks, and whales. A man caught by one would be powerless to resist, and would be torn to pieces by the hooks, or ripped up by the animal's parrot-like jaws. One of these horrors was found asleep off Newfoundland many years ago, and was unwittingly struck by a boathook. Roused to fury, it flung its gigantic tentacle right round the boat, and would have pulled it under had not the occupants hastily slashed it off with a knife. The broken tentacle was twenty-four feet long, and is now in the British Museum.

These monsters have one inveterate enemy, the whale. The cuttlefish usually live at some depth; but the whales dive down, and either swallow them whole or cut them to pieces.

For fishing the bottom the dredge and trawl

are of course essential, and will always be employed in some form or other; but for sounding the old methods of the *Challenger*, and even the improvements made by the *Michael Sars*, are now obsolete. During the Great War it became necessary to have an apparatus which could detect submarines by sound, whence came the Admiralty idea of making soundings by echo. There are several good echo sounders now in use, the apparatus being fixed in the bottom of the ship. A hammer, electrically operated, and working in a chamber that is almost soundproof so far as the ship is concerned, transmits a sound to the sea-floor; the echo is reflected back, the time of transmission being noted. Sound travels in seawater at about 800 feet per second; therefore, by simply dividing the time interval by two one gets the depth, a labour, moreover, which is done by a scale and pointer attached to the instrument.

Many vessels, both in the Navy and the Mercantile Marine, now carry echo sounders, for they enable the navigator to ascertain the amount of water under him almost instantaneously, and without checking the ship's speed. The old-fashioned lead and linesman have gone the way of the barque and the brigantine.

CHAPTER IV

Perseverance Peary

Modern Arctic work north of America started with Parry's four expeditions between 1819 and 1827, during which much of the Canadian Archipelago was discovered, and the high latitude of $82^{\circ} 45'$ reached, only 435 geographical miles from the Pole. Ross extended this work, besides discovering the North Magnetic Pole; while Sir John Franklin, by his quest of the North-west Passage in 1845-8, gave an enormous impetus to Arctic research, though at a terrible cost. After frightful sufferings he and all his men perished, and as nothing was heard of them repeated relief expeditions were sent out in search of them, by the British Government, by Lady Franklin privately, by the United States, and by other sympathizers.

The first important result was that a British search-party, under Sir Robert McClure, discovered the N.W. Passage in 1852; but nothing was learned of Franklin; and after several

attempts the British Government, to its eternal disgrace, left him to his fate. It was now that the heroic Lady Franklin arranged for yet another expedition to go north in search of her husband, the vessel being the *Fox*, and her commander Sir Leopold McClintock. Short, stocky, and taciturn, McClintock was a man of inflexible courage, and when his ship was beaten and battered out of Davis Straits, he simply turned her back again, with the quiet command, "Northward ho!" He discovered relics of the Franklin disaster, besides making some wonderful sledge journeys; in fact, the British sledging of this expedition, and especially Lt. Mehan's party, surpassed anything that has ever been done by men not assisted by dogs—not even excepting Scott's work in the Antarctic.

In the meantime Elisha Kent Kane, an American, had also been engaged in the Franklin search. He went farther north than the British, keeping up the Greenland coast through Smith Sound to the Kane Basin. Although unsuccessful in his main purpose, he greatly advanced our knowledge of that region. This expedition covered the years 1853-5, and involved some loss of life and much hardship.

In 1862, another American, the unfortunate Hall, followed Kane's route in the *Polaris*, and finding an opportunity of getting through the

ice in the Kane Basin, he forced his way past Kennedy and Robeson Channels into Lincoln Sea, finally attaining $82^{\circ} 11'$. Unhappily he died there, but his crew, after losing their ship and undergoing on the ice-floes adventures which fully equalled those of Shackleton's men after the *Endurance* sank in 1915, were providentially drifted on to the Labrador coast, and saved.

In 1875, Sir George Nares, who had given up the command of the *Challenger* in order to undertake Arctic work, was sent north with the *Alert*. He followed the routes of Kane and Hall, and like the latter succeeded in getting the ship through the narrow northern channels into Lincoln Sea. During the subsequent journeys Lt. Aldrich reached $82^{\circ} 48'$, while Commander (afterwards Sir Albert) Markham pushed out towards the Pole through the terribly hummocky ice, and attained the then farthest north of $83^{\circ} 20'$. Much useful mapping was done, and this expedition, despite very great sufferings, was by far the most successful until Peary came on the scene.

The route of Smith Sound being now well recognized, the United States sent Major Greely there in 1881-2. He also penetrated to Robeson Channel, on the Grinnell Land shore of which he established a permanent

land base, Fort Conger. We shall hear a good deal about Fort Conger later. By the sledge parties under Lockwood and Brainard $83^{\circ} 24'$ was attained, thus they slightly surpassed the British achievement. Of more importance was the tracing of the Greenland coast round for a good way towards the north-east, but that huge icy wilderness was not yet shown to be an island though the probability was suspected.

This was the position when, in 1886, Robert Edwin Peary made a summer trip to the west coast of Greenland, and thereby settled his own destiny and that of North Polar exploration.

Peary was born at Cresson Springs, Pennsylvania, on 6th May, 1856, and was trained for a surveyor, his college's name being perpetuated in Bowdoin Bay, Greenland, where he spent many a weary day. He started his career as a civilian, but eventually entered the U.S. Navy Yard. Tall, of rather spare build, and with intense determination and an almost inexhaustible reserve of physical strength, he was admirably fitted by nature for a roving life; and in 1885 we find him in the mosquito-haunted jungles of Nicaragua, as assistant surveyor on the Ship Canal project for joining the Atlantic and Pacific Oceans. Then came the Greenland trip, a holiday affair; and then, in 1887, he was back again in Nicaragua, this time in charge of the

ultimately abortive project. The cold, sharp breath of icy winds, however, had touched his cheek, and the enervating south no longer held any charms for him.

As you probably know, Greenland is green only in name; except for a few Danish and Eskimo settlements, and a few oases in sheltered places, its coast is made up of rugged mountains and inaccessible cliffs, while the whole of the interior is buried under a shield-shaped ice cap, reaching more than 10,000 feet above the sea in places, and probably more than a mile thick.

Peary's 1886 trip was to the principal settlement, Disko Bay, whence he advanced some way into the icy desert, reaching a height of 7500 feet, and experimenting with the conditions of travel. On his return he planned several further journeys, all designed to define the limits of the ice cap, and particularly to cross from the west to the east coast. In 1888, however, while he was still engaged on his duties at the Navy Yard, Fridtjof Nansen, a young Norwegian scientist of twenty-seven, who died in 1930, accomplished what had hitherto been considered impossible, by crossing from the east coast to the west, with the certainty of destruction if he failed.

Deprived of the opportunity of crossing

Greenland, Peary now turned to a much more arduous project, the proving whether it was an island. At the back of his mind was the idea that if land extended north, via the unknown part of Greenland, the ice cap would afford an ideal route to the Pole; if not, then at least a good nothing would be gained by the exploration of it, besides the credit of proving that the huge ice cap was insular. Raising funds by private subscription he obtained eighteen months' leave, and set out on his first big expedition, that of 1891-2.

The ship was an audaciously small one, the *Kite*. At that time, and for some years afterwards, Peary believed in the greater relative efficiency of small parties: the fewer to feed the faster could they move, and the less had they to carry or to shoot. He was also unalterably convinced of the superiority of dogs over men for hauling sledges. Despite the inevitable cruelty, his actions showed that he loved his dogs, but there is something very fine and noble about the man-hauling employed by such men as Mehan and Captain Scott.

The personnel of the first expedition was rather remarkable. Mrs. Peary went, the first woman of a civilized race ever to brave the terrors of an Arctic night. Peary's negro servant, Matthew Henson, also accompanied

him. Henson was a tall, heavily-built young fellow, enormously strong, and possessing unbounded courage, unbounded faith in Peary, and an unquenchable love of adventure. He participated in all the Peary expeditions, and was subsequently described by his leader as the finest Arctic sledge driver in the world. Messrs. Gibson, Astrup, Verhoeff, and Dr. F. A. Cook completed the party. The last-named served with distinction and great enthusiasm; the dark clouds of fraud and falsehood which were to make his name a byword had not yet appeared on the horizon.

Arriving at Smith Sound, and passing the large Eskimo camp at Cape York, they decided to winter on the Greenland coast. A site was found in McCormick Bay, where a warm winter abode was erected, it being named Red Cliff House. Here Mrs. Peary stayed during the longer journeys, though she participated in most of the short trips. Every effort was also made to attract Eskimos to settle in the vicinity.

During the voyage out, an accident which nobody could have prevented deprived Peary of the use of a leg for two months. It was caught between the tiller and the rail, and snapped in two. Dr. Cook set it skilfully, and Mrs. Peary nursed her husband assiduously; nevertheless Peary was confined to bed for a

long time, and nearly a year elapsed before the limb became sound again. His introduction to his winter quarters was from a stretcher, to which he had been strapped; the place where he made his first painful hobbles bore the affectionate name of Cripple Beach.

After the winter quarters had been erected the most important work remaining for that season was twofold. First, an examination must be made of the edge of the ice cap, and a practicable route found up it to the great white slope inland; and when this had been done, a sledge party with stores to form a *depôt* must go as far north as possible, and dump the stores for the winter, so that they could be used by the sledging parties next year. Secondly, it was vital for the good health of all that as much fresh meat as possible should be killed, before darkness and frost drove the walrus, seals, and hares away.

Peary had already acquired very definite ideas about Arctic travel. He intended to live "Eskimo fashion" as far as possible. His tents, for the most part, would have to give way to the Eskimo snow hut, or igloo; while his clothing would be made, to his own patterns, from reindeer skins, prepared by the most expert Eskimo sempstresses. This was the reason which encouraged him to open up

relations with every settlement, especially that at Cape York; he argued that if the people of the country did not know how to live in it, then a stranger would be still less likely to do so. The need for clothing necessarily involved reindeer hunts also.

A party was now sent out to explore the edge of the ice cap, and to find a way up. It was also intended to lay depôts on the ice, so that the sledge parties might have less to carry next year. With the best will in the world, however, the depôt party could not make much progress; for after a difficult climb to the ice edge, it found itself on a stony mass of boulders and mud, the *moraine*, beyond which deep crevices seamed the icy surface, while temporary lakes and rivers added to the difficulty of travel. The worst obstacle of all was the wind. Once a man had surmounted the moraine, he stood every chance of having his head blown off. Sweeping down continuously from the high frozen plateau, a biting, killing wind howled against the moraine; and when a storm arose (as happened every few days during the autumn and spring) it was often impossible to move; for the gale tore away everything that rose more than a foot or two above the surface; it swept up the fine powdery snow, blinding anybody who was foolish enough to brave it;

snowdrifts buried the sledges; and the roar of the wind made speech impossible. Such were the conditions which gave a rude check to the first proud hopes of 1891.

Meanwhile the leader and Mrs. Peary had gone fifteen miles from the house by water, to see the *depôt* party on its way. They had a stout little boat, with oars and a sail, and they were accompanied by an Eskimo in his kayak, a queer craft, pointed at both ends, covered with skin, and having a hole that exactly fitted the owner's body. Peary was still a cripple, and after bidding good-bye to the men he returned with his wife to the shore. The two boats were anchored together. A sudden squall now sprang up, and the anchor commenced to drag. It was blowing off the land, and every moment it carried the boat, which had nearly everything on board, farther out into the fjord. Fortunately they had a rope with which they tried to lasso her, but it was not long enough. Had Peary been able to use his leg it would have proved an easy matter to wade out and secure the boat; as it was, he dared not go in, while the Eskimo would not, on account of a racial dislike to swimming. Dr. Cook was in the vicinity, but not within hail. Meantime, the prospect of a fifteen-mile tramp over the rocks appeared to the cripple every

moment more likely. However, Mrs. Peary gallantly waded into the icy water, and after two or three attempts slung the rope on board. This was a more venturesome action than perhaps you can realize, for immersion in that latitude, with no means of drying oneself afterwards, is a very serious matter, and not to be undertaken except through sheer necessity.

Meanwhile the snow continued to whirl around them, and the wind to get up force. They entered the boat, and pulled her into deep water; then the Eskimo, struggling to step the mast, dropped it right across Peary's broken leg! They now took to the oars, the wind rising all the time, and brought her back under the shelter of the cliffs, when they laboriously made for home.

Dr. Cook now appeared on the scene. This added to their man-power, but did not suffice to get them home. The wind had now become so furious that they could not prevail against it; the boat was hauled up on a little beach, and they crouched under her side, four utterly miserable people, until the next morning, when the storm went down, and they at last got back to the house.

One would have thought that this experience would teach the explorer the need of doing nothing until his legs were sound, but no; his

ardour and enthusiasm must take him out hunting, and one day, while still a cripple, he participated in an exciting walrus hunt. Most of the party were in the boat, along with Mrs. Peary, when they unexpectedly ran into a school of about a hundred walrus, huge, ugly, and dangerous beasts, which eyed the boat with malignant glare. Walrus, like musk-oxen, baboons, and many other wild animals which live in herds, are responsive to the will of a leader. If the leader fights they fight, if he bolts they do likewise. The leader of this herd, with a snort and plunge towards the boat, quickly put his intentions beyond doubt, and soon the water all around the little party was lashed into foam, and weird heads with arched tusks gleaming, emerged from it every moment. They were driven off, however, by a hail of bullets from the Winchester repeaters, Peary taking his part in the slaughter, although he had to lie in the bottom of the boat, while Mrs. Peary loaded the rifles.

The long winter—the first that a white woman had ever spent in such a latitude—passed rapidly and pleasantly enough. Peary's leg mended, and he was able to carry out most of his projected labours. A number of Eskimo families were induced to come over and camp near Red Cliff House, where employment was

found for them. Reindeer skins were cleaned, then Peary cut them into the patterns for clothes, which the Eskimo women sewed up. He always declared that without this clothing, prepared in this way, it would have been impossible to brave the terrible conditions of some of the snowstorms and gales. For the men of the party there was too much to do for any feeling of gloom to arise during the long night. Sledges had to be made, loads worked out, and equipment for the journeys prepared. At every opportunity—that is, whenever there was sufficient moonlight to make it possible—Peary ordered practice on snowshoes and ski, so that all might be prepared for the conditions with which they would have to battle inland. Meantime, routine observations of wind, temperature, and tides, went on uninterruptedly, and this job was no sinecure, as instruments had to be handled with the bare fingers, in temperatures such that the metal burned as if it were extremely hot. If one's hand touches metal in extreme cold, and is allowed to stay there, the usual result is to pull off the skin.

None of them knew at this time just what conditions they would meet with later, but a spring journey, intended to last only two days, gave them a very good idea. In February, Cook, Astrup, and Peary started out for the

ice cap on a short journey to observe the rising of the sun, taking only two days' supplies. Properly to appreciate what follows, you must understand that an imperfectly clad man who is subjected to Arctic cold rapidly develops frost-bite, and that after the first nip, if the frost-bite is not rubbed so as to restore the circulation, the area of freezing grows insidiously, with no further pain, so that a neglected frost-bite may readily result in the loss of toes, fingers, or even limbs. Moreover, the possibility of neglecting a few frost-bites is greatly heightened, when one is struggling to maintain one's balance against a furious gale, and to keep the drifting snow needles from completely blinding one.

The sunrise party built an igloo at the desired spot, intending to stay there for the observation, and then return to the house. The igloo was just large enough to permit a man to stand upright within. Its walls, which were made of blocks of snow cunningly dovetailed into one another, rose four feet six inches above the surface, being nine feet long and six feet wide; for the roof (also of snow) the Eskimos use supports of willow or ash, but on this occasion Peary employed the ski runners. The floor was hollowed out one and a half feet below the surface, so as to give about six feet

of internal height. During this operation the weather was warm and misty; and when they retired for the night, each man in his own sleeping bag, they removed most of their clothes, and had on only their underclothing.

The wind now began to howl, and to drift the dust-like snow into the igloo, although the entrance was closed by a snow block. Peary awoke at four o'clock in the morning and noticed the snow, but without realizing that anything was wrong he dozed off again, only to be aroused some time later by a dead-weight. Shaking himself, he found that he was almost buried in drifted snow, an incessant whirring and roaring went on outside, and to make matters worse, there were ominous cracks in the roof. Even as he shook himself into wakefulness the roof came down, and suddenly he became conscious of the cold icy blast, the stinging frost-needles and the dull quarter-light.

His shouts, together with the shock of the collapsing roof, awoke the others, but they were frozen in their bags, and could not get out. Struggling furiously, Peary and Cook broke away the ice from the tops of their own bags, but they dared not emerge, because their clothes were all buried somewhere under several feet of ice and snow, and Peary, for one, was wearing nothing but an undershirt.

Their attention was drawn to Astrup, who could not even free his head, so while Cook broke the icicles away, and made a hole through which the unfortunate Norwegian could breathe, Peary rolled over the top of the wall, bag and all, and bumped down heavily on the snow outside. He then rolled round to the shovel, which had been left outside the entrance, and worked his way back to the broken remnant of the wall, thankful for even that slight shelter against the fierce wind. He dared not expose himself below the shoulders, but with Cook's aid and the shovel, the head of Astrup's bag was freed, and the astonished man sat up.

They were now in a parlous plight. Their clothes were deeply buried; it was impossible to stand against the wind; and they huddled together for warmth and comfort under the miserable bit of snow wall, praying for the wind to cease. Of course, they had no food, and there they stayed throughout the day, cold, hungry, and miserable, but forced to keep moving slightly, lest they be snowed up again. Even as it was, both Cook and Astrup got stuck fast once more, and Peary had to go to their rescue. After a time, they dug out a bit of pemmican and a few biscuits, and this dry, cold fare formed dinner and supper. Night came on again, bringing no change

either in the darkness or in the blinding snow whirls. The wind was so bad that Peary, leaning up against Astrup, had to shout at him before he was heard. While the exhausted men dozed the wind dropped, and it commenced to rain. Here was a pretty predicament! Of course, the drops froze as they fell, and if there were much rain, the precious clothing might as well be beneath an iron sheet, for there would be no hope of getting at it. A more pressing difficulty was the necessity of moving the bags to and fro every few minutes, otherwise they would have been frozen stiff. Providentially, however, the rain soon ceased; and the unfortunate men, in some thirty degrees of frost, made a bold dive into the snow and extricated their belongings; and then had to dress in the open air.

Despite all this they just managed to secure a fine photograph of the sunrise next morning.

After various spring trips Peary, Cook, Gibson, and Astrup started on the main journey to the north-eastern extremity of Greenland, crossing the ice cap. All wore snowshoes or ski, and the sledges were drawn by twenty savage Eskimo dogs, which incessantly fought each other until the strongest or "leaders" had made their title good: only five of these dogs survived the hardships of the long, long pull.

The start was a most unhappy one. With infinite labour everything had been got up to the moraine, and Peary, who set out last, arrived in the middle of a snowstorm, with whirls of powdery fragments rising far above his head, the wind so strong that one had to turn aside to get one's breath, and the snow-house barely visible. The dogs had broken loose from their traces, and were tearing and eating up everything they could get at. What was worse, three of them were mad, and were dying from a peculiar and terrible affliction, common in such temperatures. The animal afflicted runs round and round in circles, foaming at the mouth, bloody and torn, until from sheer exhaustion it falls down and dies. Each wild swoop, should it take the dog near another, or near a man, induces it to bite and snap, and the poor brutes frequently have to be shot to put them out of their misery. As to Peary, he found that his broken leg still troubled him, although the injury was almost a year old. The furious storm had imprisoned Cook and the other men in the igloo, and all that he could do was to join them there, leaving the dogs to do their worst.

At last, however, on 15th May, 1892, a start became possible. They commenced the long easy climb to the roof of Greenland, travelling

north-eastwards over deep soft snow. Sixteen dogs were still alive, and the sledge-meter registered the excellent distance of 20 miles per day. Soon they reached 5000 feet above the sea. Much greater heights lay on their right hand, and were ascended later.

The route was steered by compass. Peary also employed a guidon, or staff and flag, for the wind constantly blew from the interior outwards, so that as long as they kept on the high plateau it made a very useful indicator. On their left hand, receding behind one another into the far distance, a succession of black knobs indicated the landward edge of the cliffs and peaks overlooking Kane Basin; on this side, likewise, were many crevices and summer lakes, besides channels of temporary streams; in order to avoid them the travellers had constantly to bear more and more to the east, where they could obtain a better surface.

When they had covered 130 miles in this way a slow darkening of the sky until it was black with ominous clouds betokened a coming storm. The wind, freshening, cast up the snow into little whirlwinds which rose high in the air, and soon made objects more than a few yards distant quite invisible; and then, gathering strength and fury, it began to howl over that icy desert as only a Greenland wind can. The

sledges were pulled up, the dogs staked, and an igloo hurriedly built. Crawling into this out of the gale, and fortified by a hot meal, the party braved the storm in true Eskimo fashion. One man, however, had to remain outside, in order to keep the dogs from tearing each other and the equipment to pieces; this duty was taken by each in turn. This gale lasted forty-eight hours without a break. The unfortunate individual who was on guard had to face a terrible ordeal and the danger of freezing to death, while his comrades inside the hut listened, not indifferently, to the terrorizing blasts, and cooked their food, and slept.

After the tedious but necessary business of digging out the sledges had been completed, Peary and Astrup now went on alone, the others being sent back to Red Cliff House.

Peary went ahead, pointing the way, while Astrup strode beside the sledge. When the sun shone the whole surface of the ice glittered like an enormous white mirror, and so fierce was the glare that the men could sleep only by tying dark bands across their eyes. When, however, the sun was obscured by clouds, and storms were blowing up, the whole formed one vast grey whirl, indescribably lonely and desolate. One of Peary's normal expedients was to ice the sledge runners, so that they might glide

along more easily; every fresh fall of snow tended to nullify this, the sledge sticking so badly that both men had often to harness themselves to it before it would move.

They soon established a regular routine of work. They always travelled by night and slept by day. At the end of a march Peary tied up the dogs, while Astrup built a snow shelter, within which the cooking could be done; each man acted as cook in turn. They soon found that they were hardy enough to dispense with the heavy sleeping-bags, which were then thrown away; the cook for the day had the snow house to sleep in, the other man protected himself with the sledge cover. Upon rising, one cooked the breakfast while the other tackled the irritating business of disentangling the frozen and frightfully twisted traces of the dogs. The animals then had to be caught—usually by springing on them, and getting bitten in the process—and harnessed; they again had to be disentangled before starting, and likewise several times throughout the day. This is an amusement at which all polar explorers who have used dogs have hurled anathema; but there is no escaping it.

For food each man had a daily allowance of $2\frac{1}{2}$ lbs., principally pemmican (which is powdered meat, suet, sugar, and a few currants,

and has about four times the nutritive quality of an equal weight of fresh meat), with some biscuit, condensed milk, pea soup, and tea. Occasionally a cup of coffee provided variety.

On this, his first long journey, Peary underwent every trial imaginable, but he never allowed his aim to be deflected. When the supporting party turned back the two explorers had one sledge each, but shortly afterwards rough ridges on the ice wrecked one of them. Its remains were then tied to the other, making a single sledge four feet wide, with three runners.

Land was constantly visible on their left hand, the surface gently ascending and descending at the heads of the fjords.

During one of the slight descents visibility became very bad, and after a time Peary concluded that they were dropping too fast, and pulled up. Just at that moment a storm which had been chasing them burst, and they hurriedly camped. When it ceased two days later, and they emerged from their enforced confinement, they found, to their dismay, that they had got down on the upper part of a glacier, seamed by green clefts many hundreds of feet deep, and with the way blocked by jagged spikes of ice, the dreaded *séracs*. Out of this wilderness, with its many treacherous places, it took them two whole days to climb

again. Once they came within an ace of disaster, for the sledge and all its contents shot over a crevice, and was prevented from falling to the bottom only by a projecting ledge of ice. Fortunately the goods were securely lashed on, and nothing was lost. Had the sledge vanished on this occasion both men would almost certainly have starved to death. On several occasions the dogs fell into crevices, but the traces always saved them; the men did not have this unpleasant experience of feeling only the air beneath them, but in subsequent journeys one or another was constantly tumbling in to the armpits. To add to Peary's worries dog madness broke out again during this part of the journey; several of the poor brutes had to be shot, their bodies being saved to feed the remainder. It is this horrible slaughter of the dogs which so nauseated Captain Scott that he was always glad when his sledges were man-hauled.

The route now turned more and more to the north-east, as it was forced away by a line of rocky headlands, which appeared to mark a strait or fjord on the north coast. After making much easting Peary struck out for the rocks; but both he and Astrup wore footgear suited only to the soft snow of the icy plateau, and their feet were much bruised and battered by

the sharp angular boulders. A very painful trek brought them eventually to the top of a huge cliff. Three thousand feet below them lay the Arctic Ocean, stretching away to the north-east, seemingly as a limitless plain. Before them was a large bay, a westerly extension of which bounded the line of heights that they had been marching beside, and this seemed as if it might extend, as a fjord, right through to Robeson Channel or Lincoln Sea. Beyond the fjord, on the north-west, was lower but very rugged land. Mist concealed it partially, and they believed that it represented outlying islands—a mistake that was not rectified till two years later, when Peary proved it to be part of Greenland. The day was 4th July (Independence Day, dear to the heart of Americans), naturally, therefore, the bay below them was named after it.

Peary knew that the limit of what could be achieved by Astrup and himself had been reached; however, there was no harm in a short trip down to the bay, and thither they went, not without much difficulty. That they did so proved exceedingly fortunate, for there, north of the 82nd parallel, they found innumerable tracks of musk-oxen; patches of grass occurred; the beautiful yellow Arctic poppy opened its petals above the barren stones;

snow bunting and sandpipers gave a sense of home to the place; and two large black ravens lazily flew around, doubtless hoping to scavenge something from the travellers. The desire for fresh meat overcame all others. First, some hares were shot, and then the two men accidentally came upon a herd of musk-oxen, killing several of the great shaggy beasts, and reviving both their dogs and themselves with the meat.

Returning to the great cliff, they built a cairn there, in which was deposited a record of their journey; then they turned back for the long march to Red Cliff House. Apart from minor incidents, such as constant trouble with the dogs, indisposition due to the great altitude, and imprisonment in a snow hut for sixty hours while a gale thundered on its walls, the journey was uneventful. Much of the time they were at an altitude of 7000 to 8000 feet above the sea, and were constantly enveloped in mist. The course being a straight line, any deviation from it, however slight, might land them far away from McCormick Bay, and the duty of steering, which was Peary's, became very onerous. Nevertheless, the direction proved approximately true; for now, as on all occasions, Peary displayed great ability with the compass, maintaining a correct course whatever the difficulties. He once

located a dépôt to within a few yards, despite the fact that it was completely buried from view, and that there were no landmarks.

This first big journey, although its results were incomplete, gave him valuable experience, besides a confidence in himself that nothing could shake. How easily disaster might befall any of them, however, was shown on that very expedition, by the fate of young Verhoeff. Verhoeff had spent most of his time in attending to the instruments, in the tedious but important work of watching the tide-gauges and the thermometers. Shortly before the return of the northern party he went out for what would have seemed an every-day trip to an Eskimo encampment, from which he never returned. Peary made a long search for him, but eventually had to confess that he must have fallen into a crevice, and been killed.

A subsidiary but highly interesting piece of work was done by Peary and Cook jointly. They made a complete census of the Eskimos, every one of whom Peary knew personally; many of them were also photographed for anthropological purposes. Peary loved his "Arctic highlanders", as he called the cheerful little men, and he did much to alleviate the hardships of their existence, by providing them with the means of hunting and of better

living, without destroying the natural conditions under which they existed. This work was not only humanitarian; in the long run it paid. Of the six men who alone have ever marched to the North Pole four were Eskimos; Peary and Henson were the others.

No sooner had civilization claimed him again than Peary began to formulate fresh plans. The Navy Yard was his calling; but he felt that the Pole was his birthright. Accordingly, he made another application for extended leave, being granted three years; and thus the 1893-5 expedition came into existence.

Few men have ever planned more carefully beforehand than Robert E. Peary. He knew exactly what he wanted to do, and he left nothing to chance at any time. His present object was twofold. An expedition of fourteen or fifteen men would establish itself once more in or near McCormick Bay, during the summer of 1893; depôts would be laid out on the ice; and in 1894 the majority of the explorers would follow the route of 1892 until it reached Independence Bay. It would then break up, one division going north, to examine the presumed low islands there, while another went east along the coast, until it linked up with Cape Bismarck, which at that time was the "farthest north" on the east Greenland

shore. Providence, however, decided otherwise, for at the end of 1895, Peary, beaten, worn out, and reaping nothing but the barren glory of a triumph over adverse circumstances, was very little advanced beyond his limit of 1892.

He was not very fortunate in his men, some of whom failed to stand up to the rigorous conditions, and nearly all of whom took the first opportunity of going home during the second year. Only Astrup and Henson were veterans of 1892; the two most prominent newcomers were S. J. Entrikin and Hugh J. Lee. Mrs. Peary also went again, being accompanied by her maid, Mrs. Cross.

The old, old problem of explorers, finance, gave much difficulty before the start. No Government funds were asked for, or offered, and Peary had to depend upon the receipts from lectures, and upon the profits of his wife's literary work, for the wherewithal to purchase and equip his ship. Even then they were heavily in debt, but the ship, the *Falcon*, was put on exhibition at various Atlantic ports, and the money taken in this way made up the deficiency.

Immediately he returned to Greenland Peary's first duty was to inquire after Verhoeff; but nothing had been seen of the missing man. Fresh winter quarters were established in

Bowdoin Bay, not far from the old one; Eskimos were picked up, and transported thither; and the usual hive of activity sprang into being in that lonely place.

The *Falcon* being but a small vessel, she was employed to hunt walrus, while other work was afoot on shore, and the expedition was successful in slaughtering twenty-four of the huge animals, which yielded nearly 20 tons of meat.

On 29th August Astrup took a party up to the inland ice in order to establish the first depôt on the Independence Bay route; he had not been gone long, however, when he was forced to send back carrier pigeons—surely a novel means of communication in Arctic travel—asking for more dogs. Repeated efforts to carry out this depôt work were as repeatedly defeated by the weather; nothing was advanced more than 26 miles beyond the moraine, and one gale after another swept down upon the men, and drove them back to their comfortless tents. So fierce were the autumn storms this year that three sledges which had been left on the moraine were blown away completely, and were never seen again.

On 12th September Peary had another anxiety. Mrs. Peary that day gave birth to a daughter. She was named Marie Anighito Peary, and she had the singular distinction of

being, I suppose, the only white child ever to be born in such a latitude. Immediately afterwards the long winter night supervened; yet the child did not suffer by this deprivation of sunlight and was successfully reared. She proved an immense source of wonder to the Eskimos, whole families journeying many miles in the deep Arctic gloom merely to see her.

The house, which they called the Lodge, stood in a little bay not very far above the sea. One night during the autumn it was in great danger; a giant iceberg toppled over, and by its fall created a huge wave which roared into the bay, swept over the shore, and created chaos. The whaleboat, which had been by the water's edge, was hurled 100 yards up among the rocks, and stove in. What proved even more unfortunate, was that the water carried back in its recoil all the oil barrels, the dory, several bales of hay, and a number of puppies. Much of the oil was lost.

With a large party the winter passed easily. The ample supply of fresh meat kept at bay the bogey of scurvy. On 8th March, 1894, when Peary started out on his second long sledge expedition to Independence Bay, prospects looked bright; alas! it was but the cruellest deception. They had not been out five days before his two best men, Lee and Astrup, were

incapacitated, the former with a frozen toe, and Astrup with internal trouble. On the sixth day a gale drove straight down upon them; floundering through the whirling snow, pulling, thrusting and lifting the sledges, which would not budge, they made only two miles; eight of the weakest dogs had to be killed, and the two sick men broke down completely. Peary thereupon decided to send the rest on, while he and another (Clark) took back Lee and Astrup to the Lodge. He knew that two lightly-laden men could easily overtake the advance party, but he little reckoned on the trifling advance they made before he was with them again; one obstacle after another seemed to have taken much of the heart out of them, and, to put it bluntly, nothing much was done until the leader was there to do it. At this time even Peary was checkmated, however, for a three-days' gale pinned them all down to the tents, it being impossible to move. Meanwhile he had the consciousness all the time that no depôts had been laid, and that every day lost meant a day less that could be spared for exploratory work at the northern end.

Immediately it was possible to get out of the tents they started once more, but the most violent exertions carried them only another 3 miles. When night fell, the disheartened little

party crept into its two tents, not to repose, for the wind that made speech useless without was drifting the snow cheerlessly within. There were six men, three in each tent. One tent leaked badly, and two of its occupants became frostbitten; this forced Peary to collect the whole party in a tent meant for three, and it was so crowded that he and Entriakin stood between the pole and the door, all the rest of the floor space being taken up by the others. The canvas flapped madly; outside the wind howled its challenge, occasional blasts bringing a cry from the poor dogs; and inside the snow steadily accumulated, despite every effort to keep it out, until it formed such a mass that one man only could stand there. During this terrible night nothing kept them alive but their warm reindeer-skin clothes.

The storm lasted two days. A couple of dogs were frozen to death, and many of the rest were fixed by limbs or hair to the snow, and had to be chopped free. According to the instruments, for 34 hours the wind had an average velocity of more than 48 miles an hour; while the temperature averaged minus 50° F., and at one time sank to minus 60° F., i.e. 92 degrees of frost. The thought of this, with a gale blowing, is something at which to shudder.

When at length it abated, everything was

buried in snow, and the plan of the journey had been torn to shreds. From this camp the doctor and one other man returned. Four men only remained now, being combined into a single party, and even they were doomed to failure.

There were now left three sledges, each pulled by a team of eighteen dogs. Owing to the heavy snowdrifts and the constant headwind it was possible only to make short marches; and to crown all, first one sledge and then a second came to grief upon the ice ridges, and a halt for repairs was necessary. The lashing and rearranging of loads in that temperature, and with the stinging drift always in their faces and their fingers "going" constantly, was by no means a cheerful task, but it had to be done.

One curious circumstance about this march was the mirage. Across the white, featureless desert giant men, sledges and dogs appeared, treading on air, and imitating all the actions of the real ones: probably those who were at that time suffering from the demon of cold wished themselves in the desert of Egypt, with the welcome glare of a hot sun, but they might as well have wished themselves in the moon! Entrikin, another of Peary's stalwarts, now unfortunately got frostbitten feet, but he would not stop. Two days later his dogs refused to pull against the wind, and in endeavouring to

start the sledge he strained his back. This reduced the number of fit men to three.

The next morning Clark's nose was found to be frozen fast to his sleeping-bag, and it had to be thawed off. Entrikin being too ill to march, a day was lost at this place, and that night the temperature dropped to between minus 55° F. and minus 57° F.

Still Peary would not admit defeat. While he had a dog or a single helper he was determined to go on. They started again, made a short march, and then the dogs broke down. He tried a 48-hours' rest, and apparently this expedient worked, for when they next essayed to get on much better progress was made. For three days they covered an average of about 15 miles, and then, to crown their misfortunes, the most furious gale of all arose, and they were stormbound for 72 hours.

This storm completed the destruction of the dog-team. Many of the animals were buried under the snow, two were dead, and several on the verge of death, before the explorers could get at them. The men themselves were in little better plight, worn out by continuous exposure, disheartened by the poor progress, and in no condition to continue. It was already 10th April, and they were still within 128 miles of the Lodge, but nearly 400 miles from the

north coast, where their explorations had been designed to *begin*. Peary alone, resilient as a willow wand, was sound in heart and body, but he recognized that it was madness to continue. Reluctantly he gave the order to turn back, and the broken-down outfit crawled home to the Lodge, leaving behind a trail of goods that had perforce to be laid in dépôts, of dead and dying dogs, and of broken sledge parts.

This concluded the principal work of the season, but it was still to be marked by one of Peary's most remarkable discoveries.

Many years earlier Sir John Ross had mentioned rumours of an iron mountain in Melville Bay, whence the Eskimos procured fragments of that useful metal, which they fashioned into tools: an extraordinary circumstance, for these primitive people had no other metals, and no knowledge of any. Led by an Eskimo, Peary and Lee discovered the place in the summer of 1894. It proved to be not a mountain at all, but a huge meteorite, weighing about 90 tons, and almost buried in snow; two smaller masses were also found, one of about half a ton, the other weighing 3 tons. The last remains of some shooting star, these fragments had fallen to the ice-covered ground hundreds, perhaps even thousands of years ago. These unbidden visitors from the ether would prove

most interesting to scientists, if they could be transported to a civilized country; and efforts were subsequently made to reach them with the ship, but unsuccessfully. In consequence, the work was put off till a later season.

When the *Falcon* returned home that autumn she carried the two ladies and the baby, besides all the male members of the expedition except only Lee, Henson, and Peary. These three, standing silently on the shore, waved good-bye to the vessel which was their only link with civilization; then they went back to the Lodge and settled down to the tedium of the long winter. Peary now began to rely more upon his Eskimos, and in his winter and spring trips he engaged their interest sufficiently for many to volunteer to accompany him up to the Great Ice, which, till a year or two before, none of them would visit under any circumstances.

In the spring of 1895 Peary and his two loyal men made a fresh attempt to cross the terrible ice cap. Six Eskimos accompanied him at the start; he had sixty dogs and six sledges. The Lodge was locked up, and those Eskimos who had found employment near it went back to their permanent camp.

All the equipment for this journey had been saved from the wreck of last year, and was makeshift and incomplete. The worst weak-

ness was in the commissariat, for provisions were neither plentiful nor varied; almost from the start the little party had to be strictly rationed. However, Peary relied upon picking up the depôts at which he had been forced to leave so much during the retreat. In this he was sadly disappointed.

They got successfully to the site of the first depôt, but despite a long search not a sign of it was to be found. The weather being favourable, however, they pushed on, marching up to thirty miles a day, until they came to a place where 1400 lbs. of pemmican had been buried; it was upon this that Peary chiefly relied for provisioning his sledges. To his dismay, it was buried under the white mask, and could not be found anywhere. He at once sent back his faithful Eskimos, while the tracks of the outward journey were still fresh. He says of them with justifiable pride, that they had followed him "where none of their tribe had ever been or dared to go before".

He explained the position to Lee and Henson. They had enough food to get to Independence Bay on reduced rations, but no more. It would be their first business on arrival to catch and kill musk-oxen for their further supplies; but as musk-oxen had been very plentiful two years earlier there was no reason

to think that they would be scarce now. On the other hand, if anything went wrong the party would certainly be doomed. They were both brave men, and they took the risk; if it were good enough for their leader, it was good enough for them. So they marched forward over the ice, determined to conquer or perish.

There were forty-two dogs left. Peary went first with one sledge, marking the route. Then came Henson with a sledge and trailer, and Lee brought up the rear with another sledge and trailer. When they had proceeded in this wise for three days Lee became indisposed, and the other two tied up the dogs and left them to their own devices while cutting up the meat and making camp. The dogs seized this opportunity to break away from the stakes to which they were secured, and swept across the camp, still tied by the traces; everything was upset and pandemonium reigned for some time, and it afterwards took five hours to straighten out the knots, in a temperature 25° below zero, with falling snow and a biting wind.

Of course the usual storms had to be battled against. One into which they ran was so furious that it flattened the tent on top of them, keeping them underneath the load of snow for two whole days, in acute discomfort. Two days seemed the average duration of the gales. A

couple of dogs had to be killed at this place, to provide food for the remainder.

The elevation was now 7500 feet above the sea, an altitude at which any exertion beyond a certain limit speedily induces exhaustion; the dogs, moreover, were not pulling well, and one sledge had to be abandoned. Troubles now followed one another in quick succession. Immediately after passing the 400th mile, and just as they were commencing the downward slope to Independence Bay, the runner of the tent sledge broke. Then it became necessary to feed the remaining seventeen dogs on each other, in a desperate attempt to make the land; for they fondly hoped and believed that with hard rock once more beneath their feet game would speedily be found, and their troubles would be removed. Marching on reduced rations is not pleasant at any time; in the Arctic it is a bitter privation, for there the normal ration far exceeds that which a man can eat in a moderate climate. Hunger and desperation spurred the three men on as nothing else could. At last a dark speck, far ahead to the left! Then another! The land! It was only just in time, for they were now reduced to semi-starvation, and were correspondingly weak, while of their dog team only eleven animals remained. In order to get down to the hunting-ground with

the least delay, Lee, who was in the worst plight, was left at the top of the slope, 4800 feet above the sea; while Peary and Henson hastened down, with one light sledge and their rifles. The ground offered all the usual difficulties. Before leaving the snow they frequently fell into crevices, and though nobody dropped farther than to the armpits, the jolt and shock were not conducive to good spirits. After this danger had been passed they had to traverse the sharp, merciless rocks, on which they slithered and stumbled, every fall leaving bruises. When they reached the valley their anxious eyes failed to discern there any sign of life whatever. The musk-oxen had gone!

Peary did the wise thing. He stopped, and slept the sleep of exhaustion. When they awakened, refreshed but still suffering from the pangs of hunger, it was to find themselves surrounded by a grey, clinging mist. They left the sledge at a recognizable place, and then marched through the mist for hours, up and down over the stones, in search of food, but nowhere could any musk-oxen be discerned. Towards evening a snowstorm came on, and they returned to their sledge, after twenty-five miles' useless wandering, tired out, disheartened, and foodless. Beside the sledge they made what shelter they could, and as soon as the storm

gave over they returned, still empty-handed, to Lee and the tent. This was probably the most critical moment of Peary's life.

All of them realized that their very existence depended now upon their rifles; but what was there to shoot? The animals had all gone; the desolate land did not yield even grass! Next morning "three exhausted men and nine starved dogs" passed the 1892 cairn, with a snowstorm in furious pursuit; fortunately, they took shelter just in time, behind a massive moraine; but they were forced to remain there, when every moment was precious, for two days, before it became possible to move.

As soon as the weather cleared Peary and Henson set out once more on their errand of life or death; taking with them all the dogs, also rations for four days. They were faced by the fact that the food on the sledge would suffice for only a very short time, even on the half rations which had long been their daily lot. Now, however, fortune turned at last. First, they shot at a hare, and you may be sure that they did not miss it. Next day even better luck rewarded them. They beat up some ptarmigan, shot them, and—most important of all—found tracks of musk-ox. They were saved!

After hunting about for some time they came upon a herd of twenty-two of the shaggy

brutes, to which they stealthily approached; taking every precaution, despite their excitement, not to let the herd escape. The oxen presently detected them, and pawing the ground, and with lowered heads, lined up facing the hunters. One savage bull took the lead, and when they had got within fifty yards, he made a motion as if to charge. At that instant Peary fired, and he rolled over dead. A moment later the whole mass of flesh would have been hurled with irresistible effect against the two men, who would probably have been trampled down and destroyed. As it was, the herd hesitated. Both men now fired as rapidly as they could; beast after beast fell, and the remainder bolted. It took until midnight to skin all the captures, and to feed the faithful, starving dogs.

Eventually they returned to Lee; the meat was packed up, and a few minor trips were made over the frightfully stony ground; then Peary, all his hopes dashed, turned the sledges homewards, not a moment too soon.

Had it not been for good weather on the return journey they would have perished. Lee was in difficulties, but he plugged along grimly, usually in the rear. The dogs, too, were mere shadows of those fierce beasts that had raced over the snow three months before; there were only seven remaining now, with

two sledges to pull. When 400 miles had still to be covered one sledge was abandoned; meantime, the plucky Lee got steadily worse, and Peary was forced to halt two days to give him a rest, feeding him with peptonoids, milk, and brandy. By 10th June only six dogs were left; on the eleventh there were five, and the men had to drag the sledge themselves, the dogs following. At this point it struck Peary forcibly that he had practically the same distance to travel as was covered by Nansen, with a fit party, in forty days; and Peary had a sick man and nineteen days' half rations! But he cast these gloomy thoughts aside, and by sheer will and determination pulled through. Whatever happened, twenty miles a day must be covered; and, to his great credit be it said, twenty miles a day *were* covered. A week later only two dogs remained; on 21st June there was but one, and with it rested the last reserve of food for themselves. On the 23rd, to their intense relief, the eternal round of featureless white changed; there were dark patches ahead. These were twenty miles off, but they meant land—home! There now remained only four ship's biscuits among the three of them; to save the dog, it was fed on sealskin boots and the reins. At last they reached the moraine; never were men more thankful to feel the sharp

stones beneath them! Lee came up as the others pushed on down to the Lodge, and just as he staggered in at the door, the welcome smell of hot food assailed his nostrils. The great march was over.

He returned home that summer, to the duties of the Navy Yard; to lectures and to book-writing. Officialdom was now beginning to frown upon his frequent absences; but he had won the hearts of his countrymen—indeed, of everyone who understood the value of his work—and he went on persevering in the course he had mapped out. The summer of 1896 found him back again in Greenland, endeavouring to extract the huge meteorite. He failed, but the two smaller ones were removed. He then went again, in the summer of 1897, and this time removed the 90-ton giant to New York. On each of these trips supplies for his faithful Eskimos were not forgotten. Charitable motives apart, he foresaw a time when he would lean upon them for aid still more than he had done in the past. The Pole remained unconquered; and until it was conquered "Perseverance Peary" would not, could not rest.

The story of his ultimate success requires another chapter. In the meantime, let us transport ourselves for a while to a warmer part of the world.

CHAPTER V

In Indian Borderlands

Beyond the rain-soaked hills of Assam, with their tea plantations and their dense forests, lies a wild region of mountains intersected by deep swift-flowing streams, where the forest knife alone makes travel possible, and where the roads are mere footpaths or worse, running up the faces of cliffs and down the steepest clay slopes, with neither foothold nor handhold apart from the roots and branches of trees. This is the "Hills Country". By "hills" Indian geographers must be understood to mean mountains 6000 to 10,000 feet high, with sides at any angle up to the vertical, a definition of a hill which would hardly pass muster with the Automobile Association!

Far to the south are the temples of Mandalay, with their rich colours and their curious architecture; far to the west the dusty plains of India teem with a hundred million human ants; but here, in seclusion, fear and ignorance, dwell remote and savage tribes, many of the

natives never having been farther in their lives than to the next village two or three miles away.

Numerous travellers have ventured on the fringe of these lonely wilds, while the colonizing genius of the British has pushed roads and forts little by little into the strategically important districts; but only a handful of men has ever crossed the ranges in their entirety, still more rarely has anyone ventured along the Himalayan watershed.

The headwaters of many rivers wander most intricately among the hills. Until fairly recent times it was by no means certain where even the principal streams began, for native opposition prevented any Europeans from ascending except by force, and force was strongly discouraged by the Indian Government. Native surveyors, using the same methods as we illustrated when we were looking at Tibet, had been employed to try to find the watershed, but their maps were merely approximate, and their information, based on memory (and often on hearsay), was not dependable in the case of rivers that had a habit of turning back upon themselves, and flowing out again in the most unlikely places. Thus, for very many years three problems perplexed geographers about this region. Let us glance at the solution of one of them.

The problems concerned the three rivers, Salwin, Irrawady, and Brahmaputra.

The Irrawady is the Great River of Burma. To anyone who views its wide expanse at Mandalay it seems incredible that such a large stream should commence on the southern face of the Himalaya. The Brahmaputra, a broad, sprawling, and many-braided stream, splits into numerous large headwaters a short distance west of Sadiya. Two of these, the Dihang and Dibang, have an immediate interest for us, because one or the other of them was suspected to be the Upper Brahmaputra. The two most remote branches of the Irrawady—the Mali on the west, and the Nmai on the east, running parallel but with a 10,000-ft. ridge between—also ran back to an uncertain extent “into the hills”. Beyond the Nmai branch of the Irrawady is a high, narrow mountain chain, peopled by savage Lissu; and beyond that lies the continuous gorge of the Salwin. Another great ridge, another drop, and we come to the middle stretch of the Mekong. One more ridge, and we are in the gorge of the Yangtse-kiang. Nowhere else in the world will you find four great rivers like this, all within a span of eighty miles, and all flowing in the same direction, only to debouch into the sea at points many hundred miles from each other.

North of the Himalaya explorers (using the methods which Littledale was forced to employ) gradually identified the sources of one big stream after another. Here was the Yangtse; there the Mekong. The Salwin was more doubtful, and although traced down to such a point that there is no reasonable doubt of its continuation in Burma, one stretch of it still remains untraversed. Of the Irrawady there was no trace. Far to the west, however, near the Karakoram Himalaya, rose a river, the Sanpo, which flowed east for at least 800 miles, past the valley up which Lhasa lies hidden, and towards a huge mountain knot, beyond which all was blank. According to some authors it crossed the mountains in great falls, emerging as the Upper Irrawady; according to others it formed the Upper Brahmaputra.

The probable solution of this problem was worked out by a succession of native explorers, who were sent in disguise from India. Many years ago the Pundit Nain Singh passed down the Sanpo to a spot thirty miles below the town of Tseting, but was then turned back; while in 1882 the Pundit A.K., at the close of four years' wanderings in Tibet, followed the watershed where the Irrawady ought to have been, but found no important stream there. Finally, another native, Kinthup, was sent

north specially to solve this problem by casting marked logs in the river above the unknown stretch; they were watched for on the Brahmaputra, but were not identified. Meanwhile, Kinthup had pushed down the river to Pemakochung, where there is a fall thirty feet high and a lamasery; below this he found an impassable gorge, which he went round in a great bend to the Abor country, on the Indian border. He was turned back by the Abors, was betrayed to the Tibetans, and was sold into slavery. Eventually he escaped, with nothing to show of his travels but what his memory retained.

From the facts related by Kinthup it was reasonably certain that the Sanpo and Brahmaputra were one, the connecting link being the upper Dihang; it was also clear that the river must fall 6000 feet in less than 100 miles, but whether any gigantic falls intervened was unknown. As the Dihang, almost from its mouth upwards, was long represented by a dotted line, owing to the hostility of the hill tribes (the Abors), Kinthup's solution of the problem remained unproven until three or four years before the Great War.

A very capable and popular frontier officer, Mr. Williamson, had for some years been cultivating the friendship of the wild tribes

north of Sadiya. In the spring of 1911 he was invited by one of the Abor headmen to enter their country, and while there he was murdered. The result was the usual punitive expedition, but on this occasion it had important geographical consequences.

The Abor country is a more heart-breaking place even than Greenland. It affords nothing but one hill after another. The roads are mere tracks, either spun out treacherously along the edge of the cliff, or passing up an absurdly steep hillside, to a crest across which one can almost sit astride, and with an equally steep drop on the other side. Although worn to some extent by the feet of the natives, it is covered with roots and creepers, which afford invaluable foothold and even handhold; in the steepest places ladders are necessitated. In the bottoms of the hot valleys the track is more open, for there the savages cultivate small patches; everywhere else is the densest forest.

The whole country being seamed by water-courses, some means must be found of crossing the rivers; this is provided by cane bridges of peculiar construction. Some of them are quite masterpieces of engineering. They have three stout cables made of rattan canes, firmly attached to trees on both banks, and curving down at a very steep angle till they meet in

the middle. Cross ties keep them in place, and the floor is made of a subsidiary ropework. Of course the canes give at every step, and the whole structure sways from side to side; nevertheless several people can cross at a time, and despite its appearance the bridge is perfectly safe. Far otherwise is the bridge which less skilful tribes build, and which may consist of one, or at best two cables working on the gravity plan, i.e. with the point of arrival on the far bank much lower than that of departure. On these the traveller sits in a most precarious cage, with his back to the roaring river underneath, and, trusting to luck and his own skill, impels himself along backwards by pushing with his feet, with every likelihood that the greased runner attaching his support to the cable will stick fast at the most awkward moment.

The Abor punitive expedition made some small impression upon this country. It took place in 1912. Mule roads were built, and surveyors followed the river up to the Tibetan frontier, almost reaching a place called Kapu, 2610 feet above the sea, and close to a well-known lamasery. For several reasons it was unable to proceed farther. At this point Captain (now Colonel) F. M. Bailey comes on the scene.

Bailey was already well seasoned in Tibetan and frontier travel. He had been working during the previous year with a military mission among the Mishmis, a tribe occupying the upper Dibang, and even wilder and more isolated than the Abors, whose territory they adjoined on the east. Prior to that he had made a notable journey across Central Asia, and he was one of Younghusband's men in the Lhasa expedition. He had the admirable quality of easily establishing good terms with the Tibetans. In the adventure of tracing out the Dihang above Kapu he was accompanied by a man whose tastes differed very little from his own: Captain Morshead, of the Indian Survey, a man of remarkable energy and courage. It was Morshead who did the preliminary mapping in 1921 which made the attack on Mount Everest possible, while he subsequently participated in that great adventure, being forced to retreat when severely frostbitten.

They had native coolies, inadequate supplies, abundant confidence in themselves, and some surveying instruments; and with this outfit they left Mipi, a village on the upper Dibang, on 16th May, 1913, to cross over two mighty passes down into the adjacent valley of the Dihang. It was the worst season of the year, and the monsoon had broken; consequently it

rained every day, and the frightfully poor track, the deliberate marching of the coolies, the insatiable rapacity of the leeches (which are like black threads, and have a habit of dropping down one's neck off trees, and then gorging themselves on one's blood), the occasional swarms of mosquitoes and sand-flies, contributed to make a day's march anything but happy. On each of the two big passes the snow was thigh deep, and as it was raining hard, the ascent and descent had to be made through much of this treacherous slush, while snow avalanches lent a spice of extra danger to the work. Finally, however, they got down to Kapu; duly visited the Lamasery; sent a letter to the Abor Survey Party, in order that their own identity might be placed beyond suspicion, and then proceeded, during much of June, northwards up the hitherto untrodden part of the Dihang or Sanpo, as we will now call it. It was terrible work, for all the spurs of the mountain on which they stood, and through which the river roared in one tremendous gorge, without any falls, out of sight as a rule, but clearly to be heard, were separated by equally deep minor gorges; so that to travel one mile forward meant going 3000 feet up in the clouds, and down 3000 feet on the other side. One of these spurs was a mile

high, with a slope of 45° . Nevertheless, they arrived at last at Lagung, a village in line with the east-west course of the Sanpo, and at the very apex of its bend. Here they wished to turn west, but a local official with whom they became friendly diverted them northwards, and they afterwards had to make a roundabout tour, coming on the Sanpo again above Pemakochung, i.e. in the stretch which Kinthup had described. Throughout this time, of course, Morshead steadily went on with his surveying; altitudes of streams were taken by boiling-point thermometer, and panoramas of the country were obtained whenever the vegetation was sufficiently open to enable anything to be seen. Down in the Sanpo valley, however, it was dry and relatively warm, though cold by comparison with the plains of India.

They pushed down the valley for some way, but it rapidly became forested, and eventually there was no track, other than one used by wild animals; the river, too, ran faster and faster, until it was galloping in rapids between two gigantic peaks. That on the south, Namcha Barwa, 25,455 feet, had been known before; but that on the north bank, Gyala Peri, was a beautiful and hitherto unknown snow peak, 23,460 feet high. It was found impossible to get sufficient coolies and food together to

continue; so the party broke up, Morshead continuing surveying towards the places they had passed, while Bailey, with one follower, tried to cut a way through the forest. Giant rhododendrons barred the way; higher up rose the serried rows of pines. Bears and other wild animals inhabited this forest, through which they had made a regular track, but it was exceedingly difficult for men. Fortunately, Bailey fell in with a party of natives who lived downstream, and who had been collecting honey. He went some way with them; but eventually they dodged off, camping beyond a cliff down which he had no way of getting. His food having given out, he was forced to return; and after many other wanderings in this quarter of Tibet, the two surveyors eventually found their way back to India through Bhutan. The spot reached by Bailey was about fifty miles from Lagung; the course of the river in the intervening span was not open to much doubt, and it does not appear to contain any falls, but it still has to be traversed.

The middle stretch of the Salwin, which runs in a deep gorge with forbidding hills on either side, is a happy hunting-ground for murder and robbery, and although nominally subject to China it is in reality very independent. This is the home of the Lissu, tall, well-built

savages, living in village communities, and divided significantly enough into the categories of Tame Lissu and Wild Lissu. The former are scattered along the left (east) bank of the river, and are largely dominated by Chinese influence; the latter have always displayed an uncompromising hostility to any efforts to penetrate their territory. They are armed with cumbersome swords and heavy cross-bows, the arrows being tipped with aconite (a deadly poison), which grows wild by the roadside. The villages are surrounded by small cultivated plots, and the Lissu, who live in bamboo houses raised above the damp ground, keep sheep, goats, cows, and pigs.

One incident will show you what manner of men are the wild Lissu.

In December, 1908, Dr. Brunhuber and Mr. Schmitz, two German travellers, started from Tengyueh, in Yunnan, to travel west to the Salwin, which they proposed to ascend. They succeeded in penetrating up the river for some distance, when they came to a village called O-ma-ti; here, as usual, the lack of carriers held them up, and they drove a bargain with the local headman, who undertook the service, along with eleven of his tribe. The Lissu, however, had no intention of serving, for after going a short distance they dumped

their loads on a sandbank, leaving the two travellers and their one Indian servant to their own devices. The Indian was sent back to the village to buy a fowl, and he noticed signs that hostility was intended, but the unsuspecting travellers pooh-poohed this idea, and spent the night on the sandbank, hoping that the carriers would return on the morrow. Sure enough, the Lissu did appear next day; they were all armed with swords and spears, however, and this fact should have taught Brunhuber how to deal with them. He made the fatal mistake of allowing them to come near and to argue; each of the two travellers was surrounded; suddenly one man stabbed Schmitz with a spear, and in an instant both these unfortunate men were hacked to pieces. The Indian was captured, the goods looted, and the bodies of the travellers thrown into the stream. Subsequently, the Indian made good his escape, and a punitive expedition from China captured most of the brigands.

As to the upper Irrawady, the main branch of which is known as the Nmai River, much of this was first traversed by a European in the winter of 1911-12, when Captain B. E. A. Pritchard made a very remarkable journey from Myitkyina to Sadiya, passing near the headwaters of the river. Pritchard was a linguist



E 281

COMMENCEMENT OF RAPIDS ON THE SANPO OR
UPPER BRAHMAPUTRA

*By per mission of Lt.-Col. F. M. Bailey (who took the photograph) and The Royal
Geographical Society, London*

who had spent years in acquiring a knowledge of the native dialects. He had little difficulty with the people, in consequence, but this was more than counterbalanced by the vile travelling conditions of the country.

Most of the route, though peopled every few miles by clusters of native huts, with their patches of fields, surrounded and looked down upon by the eternal forest, was entirely unknown; being represented on maps by a dotted line where the river was supposed to run. Accordingly, Pritchard took with him a native surveyor, so that mapping and pioneer journey might go hand in hand.

Myitkyina is a town above Bhamo, on the upper Irrawady; and the first few days' journey being still within the pale of civilization, passed uneventfully. They reached Hkrangkao, a village where Pritchard established a dépôt, and had nothing more difficult to contend with than the inevitable up and down grades as they passed spurs leading to the river. As they proceeded, however, the spurs closed in, and the familiar aspect of northern Burma—up one roof side, and down another, the characteristic "road"—supervened. At Hkrangkao he decided to make a side trip to the Chengkaw Mountains, which frowned down upon him on the right, and formed the Salwin water-

shed. No sooner had this excursion commenced than the porters deserted, and Pritchard and his surveyor, struggling to the tops of 10,000 feet "hills", found that they could see nothing, because of the incessant rain and mist. The traveller here developed ulcerated chilblains, and after much suffering was forced to return to Hkrangkao, with the survey unfinished. His feet now became so bad that it was impossible to wear boots, but being of buoyant and determined spirit, he decided to go on, although for a month he had to walk barefooted over the rough native paths.

The track now hugged the river, which, usually invisible, ran like a millrace on their left hand. Only now and then they saw it far below, between the masses of trees and the extraordinary hills. Like all north Burma tracks, the route was overgrown and obstructed by fallen trees and bamboos, with dark gloomy tunnels between the overhanging rhododendrons and firs. The upper parts were so slippery that even the natives had to employ pointed bamboos, which they thrust into the muddy cliffs so as to get some sort of foothold. It rained morning, noon, and night, and the mist proved a constant hindrance to surveying, for from the hilltops, so often and so labor-

iously ascended, nothing could be seen but fog. The camp fires often went out. The leeches were plentiful and hungry. Under these conditions the three or four miles per day which they achieved was satisfactory progress.

Throughout this part of the journey food was very scarce; the carriers, also, were reluctant to go farther than from one village to the next, which meant a constant succession of new men. However, they carried the loads cheaply enough "for six annas a day, or for a few brass buttons, blue beads, or other baubles". At one place hereabouts the party descended 3000 feet in $1\frac{1}{4}$ miles. Pritchard describes the people as "cunning, avaricious, untrustworthy, and excitable". They were hospitable, however, and good to their dogs. In one case he saw a Maru tribesman carry a dog across a stream, in order that it should not get wet. On the other hand, dogs form part of the menu when food is scarce. Nearly everyone smokes a pipe. The houses are built on piles, two to four feet above the ground.

They proceeded slowly, mostly in thunderstorms and rain, with occasional fine spells, during which the forest tops looked grand, with a background of high mountains. When the thunder burst, the peals rolled up the valleys like the sound of gunfire, the flashes of lightning

lending the appearance of the discharge of artillery. At one place beyond Chelapta they were six hours in going four miles; the first two miles along bamboo poles fixed into the face of a cliff, the last two through dense jungle grass, through which they burrowed like ants. On one stretch of this "road" Pritchard fell fifteen times in half a mile and "plunged literally headlong down the hillside". At another place they had to plant bamboos in front, and then to haul themselves up by their aid.

From the upper Nmai Pritchard turned westwards into Hkamti, a semi-civilized plain, where the British had an Agent, and where he had a temporary relief before tackling a patch of equally bad going on the Sadiya road. It was here that, a dozen years earlier, Prince Henry of Orleans nearly came to grief through the starvation of his party. Rain poured down incessantly, and leeches were very bad. At one place he found fifteen of them in one boot, which was full of blood. Nevertheless, after all his trials were over, and he reached the railhead at Sadiya, Pritchard regretted having to leave the wild hills, the strange people and the nomad life of upper Burma. Unhappily, their fascination led to his death, for during the succeeding year (1913) he was drowned in the Taron River.

CHAPTER VI

Adventures of the Duke of the Abruzzi

Of all the natural phenomena which make a lasting impression on the mind, mountains rank easily first. Particularly is this true in primitive or unsophisticated communities, to whom the mountains are the abode of the gods. They speak to such people with the demon voice of thunder, and the lightning is their divine anger. In their deepest recesses and up among the fearful precipices, where nothing but a bird can hang, dwell the spirits of good and evil. The avalanches, daily thundering down from snowfields that no foot can reach, are but a warning to the inquisitive to keep away. Even the tourist experiences such emotions when first he beholds the grim rocky face of the Matterhorn from Zermatt, or the mass of Monte Rosa from the south.

To the trained mountaineer—he who is skilled in the use of rope and ice-axe, to whom

the proximity of a vertical drop of thousands of feet means nothing, and who regards as "easy" a slope as steep as a house side, provided it gives him hand- and foot-hold—mountains present another aspect. Their serene beauty—the clouds that float around their summits, the glorious sunrises, the pictures they present of Nature in her most savage and yet most imposing guise—tempts him as the magnet tempts the needle. To tread upon their highest snows, to assail them by the most difficult ways, and to conquer the most dangerous obstacles, are to him the cream of life. And of all the many skilled mountaineers who have risked life and limb in battles with the mountains, none has dared more, or been more successful, than that brave Italian Prince, H.R.H. Luigi Amadeo, Duke of the Abruzzi.

From his youth onwards a passion for climbing, combined with all the resources attached to his station, and a great natural organizing ability, led this real Duke (for Duke or *Duce* means leader) to attempt feats that had hitherto defied the stoutest-hearted mountaineers, and by a happy combination of skill and good fortune, he succeeded in three very notable enterprises—the first ascent of Mount St. Elias, the first complete penetration of the Mountains of the Moon, and the attain-

ment, in the Karakoram Himalaya, of the highest altitude ever reached; the last being a record that still stands, apart from the Everest expeditions. Singularly enough, all these performances were on mountains which lie on the borders of the British Empire. By way of a diversion the Duke took an Arctic expedition north in 1900, when one of his sledge parties secured the coveted "farthest north"; and this endured until Peary wiped the slate clean in his journeys of 1906 and 1909.

Moreover, the Duke showed himself to be no mere record-hunter. Trained surveyors and meteorologists accompanied him on every trip, and he had besides the services of perhaps the finest landscape photographer in the world, Vittorio Sella. Thus all the Abruzzi expeditions materially increased geographical knowledge.

Nurtured within easy distance of the Alps, the Duke's thoughts naturally roamed farther afield. At first he contemplated an attack on Kanchenjunga, the second highest peak in the world, but political considerations compelled the relinquishment of this idea. He then bethought him of Mount St. Elias, a giant peak on the border of Alaska and Yukon, and the summer of 1897 found him threading a way among the maze of mountains and glaciers to the base of this mountain. On the way he encountered an

American expedition, under H. G. Bryant, which was returning home after having failed in the ascent.

In many respects Mount St. Elias is the noblest mountain on the earth. It overlooks the Pacific Ocean, from which it is less than forty miles distant, and it is so much higher than the surrounding country that it can be seen from a steamer 150 miles away.

A fairly symmetrical mass, its summit rises into a huge blunted triangle, 18,000 feet above the sea; on either side a great buttress rests, but several thousand feet lower, as if conscious of inferiority; there is then a downward slope for some distance. The whole of the Pacific face is gashed by gigantic precipices, with a total vertical fall of three *miles*; they are largely bare rock, but from their upper parts avalanches continually fall, looking at a distance like clouds playing about the face of the peak. One of the biggest glaciers outside the Arctic, the Malaspina, spreads like a vast white tablecloth across the thirty miles to the sea, rising at its upper end into ordinary glaciers of steep slope, which have their heads in the peaks. Except for Indian encampments some distance away the neighbourhood is uninhabited.

Attempts to explore the vicinity of the peak, and to ascend it, had been made by several

people before, especially by Seton Karr, Topham, and I. C. Russell, of the United States Geological Survey. Mr. Russell, in particular, made a very complete reconnaissance, and his adventures of 1891 will show you very clearly what conditions the Duke had to meet six years later.

The only convenient way to get to the peak, other than a most roundabout and difficult route through the interior, is by water. There is no proper landing-place; but in Icy Bay, where the Yahtse River carries the drainage from the Malaspina Glacier, rowing boats can reach the shore in favourable weather. At all times long Pacific rollers break in heavy surf, and it is necessary for the boats to ride on the waves, and seizing the favourable moment, to row in hard, and be hauled up before they are overturned. The goods are flung out pell-mell on the beach, and as many of them as can be saved from the recoiling waves are afterwards carried up to safety.

Mr. Russell took a small but competent party, being landed by sailors from a United States gunboat. At the first attempt two boats were overturned, and four men and an officer were drowned. I mention this disaster just to show you that landing in Icy Bay has its perils.

Once ashore, and while their effects were

being dried, the party looked round. They found themselves in an open forest, clumps of spruce and alder trees alternating with meadows in which were buttercups and other northern plants, besides masses of wild strawberries; there were also numerous tracks of bears, which feed on the fruit. Passing inland, the expedition had to cross the many branches of the Yahtse, which, like all glacial streams, was swift, treacherous, and constantly changing its course. To wade over the shallower places involved the risk of being pulled down by quicksands; on the other hand, to fling a tree across was only a temporary expedient, for the river would speedily undermine the bank and carry the bridge away.

The expedition lived in tents. Every night the blue smoke of its camp fire curled up to heaven, and every night the wolves could be heard howling from afar, while the embers glowed, and the tired men sank into repose. The greater part of their supplies had, of course, to be carried with them, but they were fortunate enough to shoot a bear, which furnished them with fresh meat.

They first moved inland a mile or two, when they were confronted by a steep slope, little less than a cliff, and 300 feet high. It was covered with earth, boulders, and angular

fragments of stone. At a thousand points springs jumped out. Ferns grew in boggy places; while spruce trees, with a mixture of alder, leaned at every angle down to the horizontal; for landslides had been frequent. All the vegetation was matted together by berry-bearing shrubs, and by the terrible spiny "devil's club".

This leafy place was actually the front of the great flat Malaspina Glacier. All the rocks which that ice had brought forward to its snout during many centuries had collected here into a moraine; and on to the moraine seeds had blown, and the damp, warm Pacific winds, aided by the long growing season, had done the rest. By digging a little way into the mud or stones, it was possible to see the ice beneath.

They cut a way to the top of this curious cliff, to find themselves in a dense forest. Like the other, it was actually growing on ice, and it was so matted and impenetrable that they were a whole day in cutting through its width of four miles. Tracks showed that it was haunted by game of several kinds; bears and wolves were undoubtedly the most common.

Once through the forest, they came to a dismal wilderness of rocks and mud, slippery in the extreme, and looking for all the world

like a succession of huge rubbish heaps side by side, except that none of it was human rubbish. Slithering and stumbling over this they came at length to clean white ice, and there stretched before them, as far as the eye could reach, the vast plain of the Malaspina Glacier, its surface moulded into low mounds and dotted by many strange little circular green lakelets. In order to cross this featureless expanse Russell laid down flags to point the way.

Beyond the Malaspina Glacier they came to a rather rough little belt of hills which, starting in the southern face of the mountain, thrust their end out among the ice. On the east of them, an ordinary glacier ran up to the avalanche region; beyond that was a similar line of low hills, and beyond that, in the cracked and jagged surface of a second glacier, lay a way round to the back of St. Elias—the only way to the top.

Russell attempted this twice, but bad weather beat him off after he had reached 14,000 feet above the sea.

The Duke of the Abruzzi, of course, knew all these facts which his predecessors had had to find out one by one; nevertheless it took him more than a month to get-up to the glacier at the foot of the peak. On 30th July, 1897,

he started on the ascent proper, reaching about the same level as Russell had done, and next day, without any fuss, his flag rested on the summit. So much for Mount St. Elias!

His next venture was in search of the laurels that had been so hardly won by Nansen and Johansen, only four years before (1895). Drifting, Viking-wise, across the Arctic Ocean, Nansen had left his ship, the *Fram*, and with one companion had made the most extraordinary sledge journey on record, during which he attained the then "farthest north" of $86^{\circ} 14'$. He returned, after many hardships, to Franz Josef Land, a northerly group of uninhabited islands.

This exploit had fastened the popular imagination upon the Pole, and among others the Duke was fired to emulate Nansen's great example. He carefully planned a strong programme, and in June, 1899, his yacht, the *Stella Polare*, reached Franz Josef Land. The season proved remarkably open, for the ship was enabled to steam past Nansen's winter quarters, and even past the northernmost of the islands, into the open ocean. This finally proved that there was no land route to the Pole on that side.

Returning to Teplitz Bay, Crown Prince Pudolf Land, winter quarters were established;

an observatory was set up, and preparations went ahead for a journey northwards in the spring. During the preliminary sledging the Duke's hands were badly frostbitten, so that when the real adventure started he was perforce left behind.

The Polar party was led by Captain Cagni. He set out on 11th March, 1900, with twelve companions. The plan was that at given points three men should return, until only three remained with the leader. They had at first much trouble with the hummocks and lanes, but conditions improved later. They passed Nansen's farthest north, reaching $86^{\circ} 33'$. This great effort, however, was made possible only by cutting down the rations to a minimum, and although the ice continued favourable Cagni was forced to turn back. They had to slaughter the dogs to keep themselves alive, but after 104 days over the ocean the little party reached its winter quarters. Unhappily, one of the supporting parties of three was entirely lost, probably having been caught in a lane of open water and drowned, in the same way as one of Peary's best men perished nine years later.

The Duke's good fortune holding, the *Stella Polare* made a fairly easy escape from the ice. His dash for the Pole had not succeeded, but

having regard to all the circumstances, and particularly his inexperience of Arctic travelling conditions, it was a highly remarkable and successful adventure.

Six years elapsed, and by the end of that time he had been drawn to that magnetic continent whence so many travellers have never returned—Central Africa. We will follow his wanderings there in some detail.

In the heart of the continent, some distance north-west of Victoria Nyanza, lies a group of peaks, not the highest African mountains, but easily the most picturesque and mysterious: Ruwenzori, or the Rainmaker. Well do they deserve their title, for they are almost perpetually hidden by mist, which wraps itself around the peaks and renders them invisible, even though they have a visual height of more than two miles.

The demons of storm, famine, and fog long conspired to keep Ruwenzori's peaks unknown, even to the acute travellers who frequently passed beneath their shadows. They were first detected by Stanley, who, after his long and bloodstained crossing of Africa in search of Emin Pasha, ran down the mountains almost by accident. He knew, of course, that ancient geographers and native legends alike mentioned mysterious Mountains of the Moon,

whose snow-fed torrents gave to the great Nile its source, but nobody had ever seen them, and when, in 1889, Stanley emerged from the dense Congo forests, and saw ahead of him the dark outline of massive peaks, with snow on the skyline, he at once dispatched Lieut. W. E. Stairs to explore farther.

Ruwenzori comprises about a dozen summits in a compact oval mass, mostly collected in groups of two or three, with high passes or *saddles* between the members of each group, and profound valleys separating the groups. Beyond the western edge of the oval runs the deep valley of the Semliki River, joining Albert and Albert Edward Nyanzas; on the other boundaries various streams drain away to the African plateau, especially towards the south and south-east.

Thus Stanley, who was advancing from the west, came upon the steepest side of the mountains; and besides engaging in a miniature warfare with the natives, he had to contend with the mist and haze which incessantly hid Ruwenzori from view. His lieutenant, Stairs, forced a way through the long grass of the plains and the scrubby growth of the lower slopes, when he was met by natives, who rushed about, trying to drive him back by blowing horns and yelling. He pushed on

past them, however, to a forest of bamboo, through which a way had to be forced or cut. All the while ascending, he came eventually to a region of weird tree heaths and fields wet with moss. He now saw snowy peaks ahead, from which he was separated by three deep ravines full of vegetation; but now his provisions gave out, and he was forced to retreat.

Two years later the German traveller Stuhlmann ascended on the same side to 13,326 feet, but had to turn back before gaining any of the summits. A similar altitude was attained by Scott Elliott in 1893, when he made five excursions into the mountains. In 1900, J. E. S. Moore was the first to reach the snows, by gaining 14,900 feet on Mount Baker, and in the same year Sir Harry Johnston also passed the snowline on the same mountain. It should be explained that the ascent of Mount Baker is achieved by ascending the gorge of the Mobuku River from the S.E. At a remoter point this stream runs into the Bujuku, whose upper course is the true way into the mountain knot; but at that time this fact was not known, and the Bujuku was accordingly ignored. In 1905, D. W. Freshfield, a famous alpinist, reached 14,500 feet, also on Mount Baker, but was then driven back by fog and storm. Grauer also attained the ridge of Mount Baker; as did

A. F. R. Wollaston¹ a few weeks before the arrival of the Italians. Most of these travellers, of course, were aware that other peaks than Mount Baker existed, from stray glimpses through the driving fog, but none of them knew very much about those peaks, or even which was which.

This was the position when the Duke of the Abruzzi set foot in Africa.

The collection of the multitudinous requirements for a large party, and their transport to the heart of the continent, required much forethought and good judgment, even though a railway ran part of the way—i.e. to Nairobi. By 14th May, 1906, however, the expedition was assembled complete at Entebbe, with 247 negro (Baganda) porters, 26 Indian soldiers, and others, making a total of 400 souls in all.

The journey of 180 miles to Fort Portal, which is on the road to the peaks that Freshfield and the rest had climbed, took 15 days, during which the long caravan slowly wound its way across the dusty plains, camping each night within a stout thorn fence.

Fort Portal is a British outpost 5000 feet above the sea. Upon leaving it on 1st June, the Duke was uncertain where to go, not

¹ Dr. Wollaston was cruelly murdered at Cambridge University, 3rd June, 1930.

knowing which were the highest peaks, or where they lay. He followed the Mobuku valley, i.e. the route of his predecessors, though not without misgivings. It being the dry season the transport of the supplies to the outskirts of Ruwenzori proved easy, except at the River Wimi, which had to be crossed by a rope ferry, so that the laden porters should not be carried away by the current. From this point two peaks were visible, and the Duke's geographical instinct, always remarkable, told him that he was not taking the right road; nevertheless, he gave way to his advisers, and went on.

On 4th June, they reached Ibanda, a village on the Mobuku, thence clambering by a native path over a very steep hill to Bihunga, 1791 feet higher than the last-named, and 6320 feet above the sea: this was the site of the highest native dwellings, the people being naked, jovial, and peaceably inclined. Wollaston's party, which was still in Africa, had spent several months at this place, so that the engagement of additional porters became an easy matter. It proved difficult, however, to pitch the tents, owing to the scanty amount of level ground.

From Bihunga the track led over another steep hill, the slopes of which were hidden by

massed firs, tree ferns, laurels, and other trees; behind it rose other cliffs, all crowded with plants wherever these could get a hold. They were now high above the Mobuku, at this point only a torrent, and they followed the crest of the ridge until they came to an uninhabited rest-place, Nakitawa (8602 feet). Here they camped under a huge erratic boulder, the relic of a day, thousands of years since, when glaciers had crept thus far down the mountain side; opposite stood the majestic Portal Peaks, guarding one approach to the Mountains of the Moon. As all paths ceased from this point onwards, more than half the porters had now to be left behind.

The march, which was resumed in fog and rain, commenced with a very slippery descent into the valley of a tributary stream. Rising again, they came to a belt of bamboos, the southern equivalent of what Stairs had observed on the west of the mountains. A way had to be cut through this, while the porters dumped their loads and jabbered, and the rain poured down; it proved no light task, for fallen bamboos lay across and between those still standing, and had created an inextricable tangle. A common noise in the bamboo zone was the chattering of inquisitive monkeys; hereabouts, also, the chimpanzee had its haunts.

Once past this jungle the column found itself in a worse plight still; a large swamp had to be crossed, where they wallowed knee-deep in squelching moss, mud, and water. Crossing the Mobuku once more, and still pushing up through slime and filth, they reached another rest point, Kichuchu. They were drenched by the unceasing rain, scratched and cut by bushes and treacherous sword grass, and covered from head to foot in mud. Nevertheless, the swamps around Ruwenzori have a beautiful aspect. They conceal many curious plants, and are the home of several remarkable kinds of sun-birds; at that moment, however, the Duke had very little use for anything but the Sun himself. Despite their hard work, they were still only 1131 feet higher than the last halting-place; while the camp site proved even worse. It was an enormous overhanging cliff; rain beat in on the so-called shelter, and water dripped down on it from above. At Kichuchu many more porters stopped, and some of the loads had to be abandoned.

They next gained a thousand feet of height by following a natural gully that fortunately seamed the cliffs; at the top was another extraordinary level plain, the rise to this point having been by gigantic steps. The floor of the plain was carpeted by a luxuriant growth

of most objectionable moss, sopping with water, and concealing beneath its leaves crumbling pieces of rotten timber, holes full of water, and sharp-edged stones; every step upon it meant the risk of a broken ankle. In all directions giant heaths stood above the green; they were veritable trees thirty and sometimes even forty feet high, some vertical, others weakened at the roots, others bending over like old men, and looking, beneath the green stringers of moss, for all the world as if its fingers had been stretched up to pull them to the ground, and to drag them rotting to destruction in its cold embrace. When the sun made one of his infrequent appearances the water on this mossy wilderness sparkled like myriads of tiny diamonds; but on a dull day, with rain beating in one's face, one's boots wet through, and everything damp, mildewed and unpleasant to touch, it was miserable indeed. Besides the tree heaths, giant groundsel and immense lobelias rose fantastically in the gloomy light; here and there were patches of big white everlasting flowers. The whole place had a silent, mysterious aspect, and was practically devoid of large animal life.

The native porters, although carrying loads of 40 lbs. each on their heads, jumped with agility from trunk to trunk, while their white

masters floundered in the morasses, or crunched down the trembling and rotten wood. Recrossing the stream once more, they were pulled up at the base of another great cliff, 650 feet high, and on climbing they were faced by yet another plain, with more of the moss, more tree heaths, lobelias, and white everlasting flowers. The air was now quite cool, like that of northern Europe; nothing but the extraordinary vegetation and the line of black porters reminded one of the tropics. This plain resembled that below in its silence and gloom, and the Duke, pushing on rapidly, outstripped his men, and at the next refuge, Bujongolo, spent a tentless night in the open. Again the shelter was an overhanging wall, reeking with damp, but each successive camp became worse than the last. When the tents arrived, tree heaths and lobelias were cut down to make platforms, otherwise it would have been impossible to erect them; as it was, they stood above one another in two groups of three, separated by an enormous boulder. Far below ran the Mobuku in a deep ravine. Overhead the rain came down pitilessly, and the mists chased each other in and out among the mountains, so that even here the Duke had very little idea where he was. It was now becoming clear why so many people had failed,

but the Duke's resources were unlimited, and he brought up more porters and more food.

The Duke, his three Swiss guides Petigax, Ollier, and Brocherel, with five negro carriers, now went on to try to discover something about their surroundings. The way grew steeper, and the treacherous moss-covered stones proved an insuperable obstacle to the natives, who were sent back. A little later the four Europeans were also compelled by mist and rain to stop, and to pitch their tent on the mountain side. Next day, however, they reached a high saddle between the peaks of Mount Baker. The Duke's good fortune smiled on him for an instant; the weather clearing, they could now make out the nature of the topography, and of the various mountains which are comprehended in the name Ruwen-zori. They were standing between the highest points of the mountain up which all previous explorers, except Stuhlmann and Stairs, had toiled: Mount Baker proper on their left hand, and a new peak, recently conquered by Wollaston, on their right. At their feet the saddle fell away into a great vertical precipice, whose base was washed by the Bujuku River, and beyond the valley of this stream were four distinct mountain masses, some of whose peaks soared far above anything on Mount Baker.

It was now plain that they ought to have gone up the Bujuku in the first instance, and not up the Mobuku, which was only a tributary. The most distant of the four mountains was decidedly the highest. It could only be reached by descending and completely encircling Mount Baker, the vertical precipice being impassable, or by returning the way they had come, sacrificing all their toil, and reascending by way of the Bujuku. Naturally, they chose the former course.

They first climbed Mount Baker, partly to get a more complete view; but even as they reached the summit mist descended upon it like a candle-snuffer, and although they remained there four hours, shivering in the bitter cold and damp, they could see nothing but the dispiriting wall of grey fog. Eventually they retraced their steps, and the next morning returned to Bujongolo.

Ruwenzori deals out his favours grudgingly. The next day it rained, and the next, and the one after that. The little camp, its tents perched like toys among the giant boulders, was washed with water from heaven and stained with water from the muddy rocks. The mist wreathed and curled up and down the valley fantastically, and the Duke, who described this place as a "dungeon", could only sit in his

tent and listen to the pit-pat of falling drops. Some variety was provided by a leopard that one night appeared in the camp, and carried off two sheep. The next day it appeared again, but becoming alarmed made off before anybody could seize a gun. These leopards sometimes reach the snow on Ruwenzori, for Sir Harry Johnston noticed the footprint of one on a glacier.

On 15th June, a fresh start was made, beginning with a descent and a great curve round the bastion of Mount Baker. Overhead hung the precipices, underfoot were the pools, the morasses, the white everlasting flowers, crinkling like paper, and the mud. To plunge along in such places was equally wearisome to the knees and to the mind, but it had to be done. At this point the negro carriers, who knew that one summit had been attained, and who saw no sense in going farther, began to give trouble, but they were driven reluctantly forward. The Swiss guides, forsaking their proper vocation, took axes, and cut down a path through the everlasting flowers and the groundsel. In this way the caravan came at length into the valley which it had seen from Mount Baker. To the west, beyond two small lakes, only lower ground lay, and beyond that, filling up the horizon, was the vast Congo

forest, with its massed battalions of billowy curving tree-tops. Out of here Stanley had fought his way seventeen years before, and was defeat to be imagined now, when a few miserable bushes alone defended the peaks? Perish the thought! For the first time for several days the sun came out during the afternoon, and sinking soon after, wrapped the tips of the trees in a blaze of crimson glory.

The next day the porters again refused to proceed. They had never been so far. The spirits of the mountain would tear them limb from limb. And so on and so on. They knew no Italian. The Duke knew no Waganda. Cajolery and bullying took the part of explanation. The frightened men picked up their loads, and they all marched on. Such occasions are always unfortunate, but this world is made up of drivers and driven.

Much time was now lost in a jungle of bushes which lay between two small lakes and the western face of Mount Baker, and through which they had to force a path. Eventually, however, this obstacle was overcome; and at last, greatly fatigued, but conscious of having the prize almost within his grasp, the Duke camped beneath the highest peaks. Mount Baker was now far away behind him. In front rose twin summits from a single base, connected

by a high saddle. That on the left hand they named Alexandra, that on the right, Margherita, a pretty compliment to the reigning Queens of England and Italy. Naturally, Margherita was a trifle the higher.

Previous experience had taught them that it was hopeless to wish for fine weather, but at dawn next morning the Duke and his three guides started, Petigax in the place of honour, and the Duke third. Of course, they were all roped together.

An hour's easy climb over the snow brought them to a glacier immediately below the two summits. It was now only 6.30 a.m., and prospects looked rosy, when suddenly the mist came down, just as it had on Mount Baker, and for all practical purposes they were blindfolded. They had noticed the right direction, however; besides, the Duke was not the man to turn back merely because it happened to be dangerous. Accordingly they climbed to the left; an hour later their alpenstocks were thrust in the soft snow on the summit of Alexandra Peak.

The mist was so thick now that they could not even see the other summit, although it was only a few hundred yards away. Their one early glimpse of it had disclosed a dangerous overhanging snow ridge or cornice, and in

the mist it was exceedingly risky to try to climb up that way; on the other hand, to go back and try another day might be fatal, in a place where the weather was so continually uncertain. Any other mode of ascent, being wholly problematical at all times, seemed absurd now, when every yard was hidden by fog. Accordingly they decided on the cornice way. Soon the slope became so steep that they were almost vertically above each other, Petigax still leading. When under the snow ridge, a narrow gully of ice disclosed itself, which led to the summit, but it was six feet high, and in itself unscalable. At this critical juncture Ollier stood against the cliff, and Petigax, clambering on to his shoulders, with a sheer drop into the mist below if anything went wrong, succeeded in scaling the gully. He then lowered a rope, up which the others clambered. The deed was done, and Ruwenzori beaten at last!

This little bit of work occupied four hours, and though the glory was theirs the view was scarcely worth it; for all they could see was the summit of Alexandra Peak and a floor of rolling clouds. At this spot, as on the other summit, water was boiled, and a thermometer read in it, to determine the height. The twin mountain they named Mount Stanley. Mar-

gherita Peak, its summit, reached 16,815 feet above the sea, the twin being a few hundred feet less.

During the crossing of East Africa, Captain Cagni, the surveyor to the expedition, and the hero of the Polar record, had fallen ill with typhoid fever, and had been left behind at Entebbe. He recovered, however, and pushed on to the highest camp with all speed, so that when the Duke descended he had the pleasure of receiving his friend's congratulations.

Besides these pioneer ascents the expedition made many more, spending several weeks surveying and photographing. Upon their return the Mountains of the Moon were mysterious no more. The Duke came to London, and lectured on his travels to a great audience at the Royal Geographical Society's request, King Edward being present.

Alaska, the Arctic, and Central Africa, by no means exhausted his energies. He reverted to the first idea he had conceived, of some great ascent in the Himalaya, and in 1910 he was in the wildest Karakoram, with an equipment as large and as carefully organized as the African one had been. The mountaineering conditions were much more severe than those of Central Africa, for the Himalayan peaks, if of rock, are often quite unscalable, and if

covered with snow are usually unapproachable because of the incessant avalanches. However, the Duke made an attempt on Mount Godwin-Austen, which failed; he then attacked a smaller summit, the Bride Peak, 25,100 feet high, and though unsuccessful in reaching the summit, attained 24,600 feet above the sea. Bad weather and the treacherous nature of the last 500 feet alone defeated him. This is the greatest altitude to which any human being has ever climbed, with the sole exception of those attained in the Everest expeditions.

CHAPTER VII

The Attainment of the North Pole

We can now return to the efforts of the Americans to reach the North Pole by way of Greenland.

It will be remembered that when we left Peary he had successfully transported the 90-ton mass of meteoric iron to New York. This was in 1897. For seven successive years he had endured the icy blasts and exile of a sojourn in the northern wastes. He was forty-one years old. The renown that he had acquired as the result of continuous efforts to explore North Greenland would have satisfied most men. Nevertheless, Peary felt that his life's work had only just begun. His object—the attainment of that geographical point which had been the aim of adventurous and hardy men for 400 years—was as far from realization as ever, and until he crossed the frozen ocean and planted the Stars and Stripes at the Pole, all rest, ease, and the enjoyment of honours

must be rigorously put aside. Accordingly, no sooner was the huge stone safely past the Statue of Liberty than Peary projected a fresh expedition to Greenland, and set about the ways and means of launching it.

He was not a rich man, for the rewards from his lectures and books were wholly absorbed in paying the expenses of his journeys. Officialdom, too, looked askance at this energetic person who persisted, year after year, in useless endeavours to reach a spot, the attainment of which would benefit nobody. The leave that he desired for the new journey was refused him. Nothing daunted, he brought other forces into play, and by the personal intervention of the United States President on his behalf the previous decision was reversed. Now came the difficult question of funds. Peary had become somewhat of a national hero; for he was intensely patriotic, and his persistent endeavours to plant his country's flag farther and farther north appealed to the popular imagination. Between being a hero, however, and obtaining the money for practising one's heroism there is a tremendous gap. The mind of the people, distracted daily from one object to another, and ever conscious of its own woes in bad trade and such-like hardships, is apt to be blank when appeals for

money are made to it. Consequently, the method that was adopted to provide Peary with funds for his work was perhaps unique. His staunch friend Morris K. Jesup founded the Peary Arctic Club, into which admirers of the explorer would pay donations, and from which the money would be found to finance each journey, for it had now become a settled conviction, both in Peary's mind and in the minds of his more intimate friends, that he would never rest until success were his, even though it meant a dozen journeys to the north. From overseas, also, valuable help arrived. Alfred Harmsworth, afterwards Lord Northcliffe, had sent the Jackson-Harmsworth Expedition to Franz Josef Land, in the *Windward*; and when it returned, bearing Nansen and Johansen on board, he presented the vessel to Peary. She was not suitable for pushing through heavy ice, but she was a useful yacht, and Peary gladly accepted her.

Thus all things conspiring in his favour, he set his face northwards once more, from Sydney, Cape Breton, on 7th July, 1898, with a large company on board. This expedition, which was to last four years, proved the most trying and arduous of his whole career.

Nothing more was to be learned from the Greenland ice cap, and he now planned to

follow the route of the older voyagers by taking his vessel through to Robeson Channel, and to winter there. In the spring, sledge journeys would be made along the shore of North Greenland, with the hope of surpassing Lockwood's farthest, and direct for the Pole, with the hope of beating Nansen's record. The scientific work would be mapping, coupled with tidal observations and meteorological records. As all his previous work had been done with the consciousness that the frozen seaway provided at best only a poor route to North Greenland, it was obvious that trouble must be expected.

The *Windward* proved quite unsuited to the severe work of battling with the chaos of hummocky floes, but she carried her crew safely into Kane Basin, and pulled up at an impassable barrier. Good winter quarters were found near Cape d'Urville, on the shore of Ellesmere Land; and during the autumn and early winter much work was done; bears and musk-oxen were hunted, to provide fresh meat, and a dépôt with $1\frac{1}{2}$ tons of supplies was advanced 80 miles north of the ship. In this work the Eskimos were again pressed into service; keenest of hunters, and most skilled of ice-men, they proved invaluable.

During this preliminary work Peary had his

first real taste of the ice-foot, a feature which has always been heartily abhorred by Arctic travellers. Theoretically, it is a platform, glued to the coast, and separated by cliffs of ice from the younger sea ice which is in motion every season. Actually, it is a chaos of shattered platforms, never at the same level for more than a few hundred yards, broken by cliffs and slopes down which one must glissade, and sometimes so crushed and fractured as to be almost impassable. Being the only alternative to the ice in the channels, which is even worse, it forms the only practicable highway for sledges; but in order to get along at the worst places men have to risk a fall of anything up to fifty or sixty feet on to the hard sea ice below, while their sledges are wrenched and strained by the continual bumps and glissades on the atrocious surface.

Having failed to get the ship through Kane Basin, Peary was desperately anxious to carry supplies so far northwards that the next spring might not be lost; for unless an attempt on the Pole is made early, the ice covering the Arctic Ocean becomes seamed by wide lanes or leads of open water, while the surface of the floes degenerates into slush through which no amount of force can drive the sledges. Fort Conger, Greely's old station at the southern

end of Robeson Channel, would make an excellent base for the northern operations; and thither, by travelling in the darkest part of the winter, Peary endeavoured to penetrate.

On 20th December, 1898, he left the ship with six men and thirty dogs. The 1½-ton depôt was soon reached, and the opportunity was taken to carry it still farther north; then Peary went on with light sledges and a minimum of men and material, in order to reconnoitre Fort Conger, which was still 150 miles off, and to see what use could be made of it. Owing to constant storms, violent gales, and deep soft snow they made poor progress; the supplies were rapidly consumed, and to make matters worse, the moonlight failed, so that they had to march by the cold, indifferent light of the stars or the impish flashing of the aurora. Naturally, under such conditions the difficulties of the ice-foot were intensified; nevertheless, Peary was determined to get through Kennedy Channel, and at last he brought his weakened party to its northern end. Across a wide opening, known as Lady Franklin Bay, lay the Fort and the entrance to Robeson Channel, but this opening was choked with hummocks in utter confusion, and in the darkness its traverse could be accomplished only with the greatest danger. Now

and again the floes, moving uneasily, crashed together with an awe-inspiring sound, huge masses being thrust up by the pressure as if they were paper; at other times the desolate place was silent, save for the whistling wind. Everything stood in shadow, so that one ran up against sharp obstacles before there was time to avoid them, or to check the momentum of the sledge.

Peary realized that he could never cross the Bay in his present condition, for his feet were giving him great trouble from frostbites—and yet everything depended upon him. He decided to make a burrow, in which he left two Eskimos and nine of the weakest dogs; then, with the remainder, he attempted the crossing. It took two forced marches, one of eighteen hours, in almost complete darkness, and at the end they had to kill a dog for food before they reached the Fort. Happily the place proved to be intact, while the stores that had been left there were still usable. Greely's papers and records were also found, and were eventually conveyed back to the United States.

Peary paid dearly for his temerity in this winter travelling. Neglect of his frost-bitten feet had resulted in their both becoming hopeless, and nothing could be done to restore the circulation, although he lay there helpless

from January 6th to 19th February, 1899. His party used up the old stocks of corn meal and molasses, breaking up boxes and barrels for fires. At the end of this time, the leader's feet not having recovered, he was strapped to a sledge and carried back to the *Windward*, the frightfully rough journey of 250 miles being covered in eleven days. During this march the temperature once fell to minus 65° F., i.e. 97° of frost, and it was never greatly warmer. A fortnight after his return, his feet making no progress towards recovery, eight toes were amputated. This was on 13th March. Yet on 19th April, only six weeks later, he started off again for Fort Conger, undeterred by previous failures, inspired only by a grim determination to attain his end.

During the spring journeys of 1899, twenty-five musk-oxen were killed, and were buried as a reserve of meat.

Peary, after arriving at Conger, essayed to go north through Robeson Channel, but the broken ice proved too difficult, and as his feet were giving trouble he returned to the ship, resting there throughout the month of June. It was now far too late to do much useful work in the north, but July found him setting out for the minor ice cap which covers Ellesmere Land, with the object of discovering

whether it was one and the same island as Grinnell Land farther north. Owing to the summer melting, deep pools and channels interrupted the surface of the ice, and it was sometimes necessary to wade waist-deep through the obstruction. Clothes and equipment alike became sopping wet; at times the party even slept in several inches of slush. Despite these difficulties he successfully made the crossing, and proved that the two formed a single island.

During the autumn he changed his quarters to the Greenland shore, which was more convenient for access to his Eskimos, besides offering a better chance to a ship, and in August he sent the *Windward* home. March, 1900 saw him back again at Fort Conger, eager to attack Robeson Channel once more.

The ideal method of attempting to reach the Pole (and that which he was ultimately forced to adopt) was to jump off from Cape Columbia, on the north coast of Grinnell Land, but this involved transporting all his supplies nearly as far from Conger, as Conger was from Etah, and at that late season failure would have been certain. He therefore put it off for yet another year, and devoted the present season to completing his Greenland labours by mapping the coast to its most northerly point.

They left Conger on 9th April, 1900, and had made but a single march when the best Eskimo became ill. Peary, whose attention to his men was unremitting at all times, took him back, while the rest of the party crossed Robeson Channel to the Greenland shore. When he joined them again they were held up by the jagged ice foot; and in order to make any progress at all it became necessary to hew a way with axes through the least rough places, and then to haul the sledges along the road. They worked on the principle that a mile made was a mile gained, with the inevitable result that they succeeded in forcing a passage out at the northern end of Robeson Channel. At that place, as we have explained, was the wide opening of Lincoln Sea, where some open water was always to be found during the warmer months. Peary's party encountered a channel more than three miles wide, stretching from shore to shore. Sometimes at such places there was just sufficient rock and ice-foot to enable the sledges to creep past; at others the cliffs fell sheer into the sea, and the unhappy explorers had to wait until the cold of night formed a thin skin of ice on the sea, when they would gingerly cross it. This was the manner in which the wide lead at the entrance to Robeson Channel was negotiated.

The young ice was obviously unsafe, yielding and cracking beneath each man's weight; but warmer weather must follow, when there would be no ice at all: the ice-foot also failed them here. Peary sent an Eskimo ahead, himself following at a respectful distance; two other Eskimos followed in the same manner, and as the ice held the remainder got across. They had not proceeded far, however, before a precisely similar obstacle held them up again.

At this juncture two of the Eskimos became frightened. Peary, whose invariable policy was never to use force with them, sent them back; leaving him with only Henson and three Eskimos. Again a thin cake of ice filmed the surface of the sea. Again the party trod daintily across it, their good fortune sustaining them for once; but the sledges were kept a hundred yards apart, and each man walked at some little distance from his sledge, so as to spread the weight. Shortly afterwards two more Eskimos were sent home. Peary, Henson, and one Eskimo continued the journey, with three sledges and sixteen dogs.

At the open lanes long detours were made, and sometimes the little party ran into sludgy snowdrifts, and all three of them had to tug at each sledge before it would budge. Slowly, but inevitably, the miles and the known land-

marks passed to the rear. Perseverance was winning all along the line.

At last they reached Lockwood's farthest, the hitherto known end of Greenland. The record of the earlier explorer was still in good condition, although it had been there eighteen years. Peary made a copy of it, and took away the original.

They now crept on, past one savage cliff after another, until they had rounded the northernmost point of Greenland, which they named Cape Morris Jesup, in honour of the explorer's friend and patron. Now, as farther down the coast in 1892, the welcome and unaccustomed movement of figures ahead disclosed the possibility of fresh meat, and soon the cliffs re-echoed to the crack of the rifles, as musk-ox, bear, and hare sank to the ground.

While on this coast they were constantly enveloped in dismal fogs; yet Peary learned sufficient of his surroundings to make it clear that northernmost Greenland was no place from which to base an attack upon the Pole.

The long journey back to Conger involved several risky crossings of thin ice; but fortune remained with them throughout, and they were safely in the Fort by 10th June.

The third winter of their exile was spent at Conger, largely in pursuit of game. During

the dark months, likewise, Peary prepared for his first real Polar journey. On 5th April, 1901, accompanied by Henson, one Eskimo, two sledges, and twelve dogs, he bade good-bye to those at Conger, and turned his face northwards. Strange thoughts must have passed through his mind as the little station slowly disappeared from view. It was his eleventh year of striving, and now for the first time he was really aiming direct at the mark. Whatever his thoughts, he was soon to receive a rude shock.

The passage of Robeson Channel proved dreadful; and by the time they had reached Lincoln Bay everybody was worn out, the sledges were damaged, and the dogs were no longer pulling. It was 17th April—too late to make another effort, too far from help to do anything but go back. Peary gave the order to return; the Fort was abandoned; and the whole expedition found itself once more in Smith Sound, where the *Windward* was brought up. He decided to make one more effort; wintering at Payer Harbour, on the Ellesmere Land coast, opposite Etah.

Peary had the pertinacity of a spider. Through the winter of 1901, two depôts were again re-established along the jagged coast towards Conger; the health of the party was maintained

by a constant supply of fresh walrus, reindeer, and other meat. The *Windward* went home again, leaving Peary and his veterans to battle with the Arctic winter for the fourth successive year. During this autumn his loyal Eskimos were ravaged by disease, and several died; otherwise the time passed uneventfully.

On 6th March, 1902, Peary once more set out for Conger, with the last of many sledges; successfully traversed the 300 miles to that lonely hut; and rested there for a few days, while the sledges were overhauled and about a hundred hare were added to the larder. On 24th March he started north from Conger with nine sledges. The lesson of last season had been duly learned, that a small party could not hope to get on unless it conserved its strength by allowing supporting parties to do the spade work.

Round Black Cape, the N.E. point of Grinnell Land, it was necessary to hug the cliffs. Peary describes the ice-foot here as "villainous", the road having to be hewed almost continuously, but the sledges were forced round it. They reached a former camp of the *Alert* expedition, and stopped there. Near this place two men nearly lost their lives, a sledge slipping when they were on the ice-foot edge, with a drop of fifty feet to the jagged blocks below. At another point, Cape Joseph Henry,

the sledges had to be engineered round a shelf of ice less than 3 feet wide, and 75 feet above the floe. Shortly afterwards three Eskimos were sent back, leaving four with Peary, besides Henson.

They now struck straight out to sea. Near land the pack ice was piled up into hummocky ridges that had been created by the pressure from the Pole, and through the chaos of blocks, spires and rubble a path had to be hewed, the first day's work yielding only five miles. Interspersed with the hummocks were areas of deep snow, where the sledges stuck, and nothing but furious shoving and hauling could get them out again. Nevertheless the second day yielded another five miles. Finally, on 12th April they were stormbound by a gale from the N.W.; and that was followed by long channels of open water, which could be crossed only by making long detours, or by waiting till they closed again. One of these channels, in particular, marked the point where the sea deepened rapidly to the Polar Basin, and this acquired an unenviable notoriety as the "Big Lead". Peary persevered, however, but day after day the same thing happened, and at last, in a maze of hummocks and deep snow, he gave it up. It was 21st April, 1902; the latitude $84^{\circ} 17' N$. He struggled a short

way ahead of his men, down to the waist in sludge and fragments of ice. Nansen's farthest was hopelessly out of his power to attain, still less, of course, could he emulate Cagni's record of 1900. For the first time his notes, made on the day, show signs of despair. The game, he wrote, was off. But even as he speeded back, beaten, to Conger, his eager mind was planning fresh efforts, with new equipment and by different means.

It was touch and go whether he ever got to Conger. Forced marches were made, so as to utilize the outward trail, but fresh snow had frequently obscured it, while the movement of the floes had altered its place; thus, at one spot, a lead had closed, and was now represented by a huge line of hummocks 75 to 100 feet high. Peary noted with anxiety that the entire surface was drifting rapidly to the east, away from his objective. The hummocks gave much trouble; and at one place, a lead opening suddenly almost engulfed two sledges and the dogs pulling them.

No man ever drove harder or more directly than Peary. When they were two days distant from Grinnell Land a violent storm pinned them down to their camp for forty-eight hours, and when it gave over the densest fog prevailed, so that he had to steer by compass;

nevertheless, and knowing too well the risks, he gave the order to go on. At last they won through, but it killed two dogs, and exhausted the men. At one camp near land they noticed their old igloo in ruins; a lead had opened right underneath it, so that "the halves . . . stared at each other across the chasm".

May saw the whole party back once more at Payer Harbour. On 5th August, the *Windward*, with Mrs. Peary and her daughter on board, steamed up to the shore; the Eskimos were returned to their homes, with a good supply of walrus meat, and Peary went south.

Three years elapsed, years of planning, of hopes in which no pessimism shared, despite all that had gone before. The Arctic had won hitherto, but Peary's resources were not exhausted. If only he could get a ship through Robeson Channel, he imagined that he would have a much better chance of success. The weakness necessarily arising from the continual struggle with the ice-foot would be avoided, and he could start fresh. He also planned to take supporting parties out upon the ocean, in the same way as had been done by Scott in the Antarctic; there was the difference, however, that Scott's "ground", though afloat, scarcely moved, whereas Peary's would be certain to alter almost from day to day.

The Arctic Club found the money. A great and dominant personality blessed the enterprise, and in his honour the ship, which had been specially built, was named the *Roosevelt*. Leave was now granted to Peary, who at that time had the rank of Commander, for one more attack on the Pole, and in the summer of 1905 he started north again, with fresh comrades and renewed hopes; in addition to the loyal Henson, a constant reminder of previous failures.

Captain Bartlett, a Newfoundlander, manœuvred the ship with rare skill through ice which would inevitably have wrecked the *Windward*. They followed Greely and Nares mile by mile through Kennedy Channel, Robeson Channel, and on to Cape Sheridan. The ship was often in great danger; but always Providence watched overhead, and she escaped. Safe winter quarters were found near Cape Sheridan, and in the next spring Peary made his effort.

His organization had triumphed over every obstacle. The supporting parties understood their work, the heads of the sledges were steadily nearing the Pole; when Nature reasserted herself in an instant, and blew Peary's plans to fragments. When they were in the 85th degree a furious gale sprang up, lasting

a week; the subsequent movements opened wide lanes in the ice, and the Commander was separated from his supporting parties. He pushed on, and had the meagre satisfaction of beating Cagni by thirty-six miles, but the Pole seemed as remote as ever. He had gone to the limit of his supplies, and he and his party scarcely got back alive. At the big lead there was an accident, three men only just avoiding death, but by great good fortune all were at last assembled on board.

Bartlett took back the *Roosevelt*, displaying the same consummate ability as on the outward journey; and so ended another chapter. Peary was defeated once more, but he could claim at last the title to the "farthest north".

However, that was not the Pole. He had spent his best years in one aim, and he refused to be overcome now. The ship was refitted, Bartlett was induced to go again. In July, 1908, Peary sailed on the last and greatest of his adventures.

Again the ship successfully passed the packed floes, anchoring almost in her quarters of 1905-6. Again a busy winter passed in eager preparations. Again, in the middle of February, a long line of fur-clad figures, barking dogs, and heavily-laden sledges set out for the Pole. This time everything prospered.

Bartlett went with the advance party; other supporting parties were to go to definite points, and then return; while Peary, at first in the rear, would gradually catch them up, husbanding his own strength and that of his men; and eventually he, with the best of those who remained, would dash for the Pole. When they started there were 7 white men, 19 Eskimos, and 140 dogs, with 28 sledges: he must have smiled, if he recollected the Greenland days, when he thought a small party the best! Several sledges were wrecked on the rough surface, but the Commander's forethought had provided for that, a reserve supply having been established on the Grinnell Land coast.

At the Big Lead the first supporting party turned back. Peary had with him two reels of piano wire for sounding; and near here a sounding showed that they had rather less than a mile depth of ocean beneath them. With a repetition of the usual incidents the remainder pushed on to $85^{\circ} 23'$, where the second supporting party turned back. There were now left 12 men, 10 sledges, and 80 dogs; they had continual daylight; and were favoured with fine weather.

With the happenings of 1906 in mind marches were so arranged that when Peary

came up Bartlett went on, and *vice versa*; thus, there could be no fear of a separation from the essential food supplies.

Latitude $86^{\circ} 38'$ was passed, amid much rejoicing, for every mile gained now meant a fresh record. From this point Professor Marvin returned with the third supporting party; but alas! it was not so easy to return as it had been to go out. At the edge of the Big Lead Marvin somehow overran his sledge, fell into the sea, and was drowned.

Meanwhile the others were gradually nearing the goal. Patches of bad snow, of thin ice, of hummocky rubble could not stop them; for the leader had determined to take no chances with the weather, and he forced them on as hard as they could possibly go.

At $87^{\circ} 48'$ Captain Bartlett turned back, with the last supporting party; from this point onwards only Peary, Henson, and four Eskimos remained. Peary reckoned that five good marches would bring him to the Pole, and with hardly an incident the distance was covered. When they arrived at the Pole, hardly knowing what they expected to find, a boundless plain of snow and ice, utterly bereft of life, and broken only by the lines of hummocks due to floe motion, met their gaze on every side. The hard-fought battle was over, and

Peary, bearing the scars of twenty years, had won.

To make sure of his position he carefully took a round of angles of the sun's altitude, lying flat on the ground, sheltered by a low snow wall, and pointing his sextant at the luminary, which, of course, was low on the horizon. He also took a sounding here; but he had only 1500 fathoms (rather less than two miles) of wire left, and it failed to reach the bottom. While being hauled in, the wire broke, and was lost.

The return journey proved uneventful, except for the remarkable speed at which it was accomplished; for two outward stages were frequently covered in one day's journey. Of course, the outward trail was there to aid them; a fierce gale at their backs also helped them on considerably. On 23rd April, after no great difficulty with the leads, they were back again at Cape Crozier. The last two marches to the ship, each of forty-five miles, were actually covered in two days. This would have been a wonderful performance for a man of Peary's age on any surface. It shows conclusively that, besides his own splendid condition, he had an unusually favourable season and an exceptionally fit personnel.

Peary returned home in triumph, marred

only by the shadow of an impostor. Dr. Cook, who had been on his 1891 expedition, and had been in Grinnell Land during the successful venture, had anticipated him, by asserting that he had reached the Pole already. Of this infamous fraud it is not necessary to say much here. Cook's records would not bear examination; and the Eskimos who accompanied him declared that he only slept two nights on the ice. He succeeded, however, in creating a certain number of partisans in the United States, and for some years annoyed the great explorer, until at length he sank into the darkness and obscurity he deserved.

Peary was created a Rear-Admiral after his return home. The honours he had so hardly won were his to enjoy for only a brief space of time; for he died at his Washington home, 20th February, 1920, after a long illness. He was only sixty-four.

CHAPTER VIII

Dr. Thoroddsen, Geographer of Iceland

In the history of travel, as in that of science, it has more than once happened that a man has gained fame solely by confining himself to a small sphere and to the determination of a definite object. Such men are true pioneers. They need not work in unknown or uncivilized lands; for even in his native country the explorer often has much to learn.

A noteworthy instance of this is William Smith, the celebrated English geologist, who flourished at the beginning of the nineteenth century. Like Peary he was a land surveyor by profession. He had, however, early learned to understand the value of fossils for dividing rocks into series according to their age; and at that period the method was novel and not at all well understood. Smith had to tour the country on account of his profession, and he made it his business to visit every rock exposure which he could, and to map it according to the

fossils. When the work was done he had to publish it in manuscript. This was the first geological map of England, and it had a great influence on all subsequent labours.

The subject of this chapter, living nearly a century later, was a man of similar tastes, a student, teacher, and geologist, by name Thorvaldur Thoroddsen, a native of Reykjavik, Iceland, where he was born in 1855.

Iceland is a small country. Moreover, it is on the tourist lists; so that one would not imagine that much could come to light through any teacher's wanderings there. As a fact, however, it is so barren in places, so difficult of access and unvegetated, that up to the commencement of the present century very little was known about many parts, and nothing whatever about others, beyond what Thoroddsen had discovered. The island is extraordinarily difficult to traverse, possessing a most complicated coastline and with an interior plateau 1500 to 3000 feet above the sea, which is overspread by lava plains, sandy wastes, torrential rivers, and ice-fields. Large areas yield absolutely no vegetation, not even grass, and as there are no railways across these wildernesses it was almost impossible to pass them, as one could not carry enough fodder for the horses.



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SNAEFELLNESS RANGE FROM HELGAFELL, ICELAND

The Geographer of Iceland 217

In 1881, Thoroddsen, who at the time was a teacher in the capital, started to remedy this ignorance. He determined to map the whole country bit by bit, traversing one area during each of his summer holidays, for that was the only time when such work would be practicable, the severe winter cold, the fogs, snowstorms and gales, making it impossible to travel far from the inhabited lowlands. The work was entirely voluntary, and some years elapsed before its value and significance were realized. Eventually, however, the Iceland Storting made him a grant; while Mr. Oscar Dickson, the ~~munificent~~ munificent patron of Norden-skiold, Nansen and many other travellers, also provided funds for the mapping. Thoroddsen continually enlarged his zone of work, until in 1898 it was finished, and he had acquired a European reputation. Let us see how he did it.

When he commenced his labours there was no map of the interior, for in many parts human foot had never trodden. During his early rambles, however, he learned that the dreaded deserts were fringed by a few small oases, two or three days distant from one another; and by getting into conversation with the shepherds, who alone knew where these oases lay, he fixed their positions, and was enabled to base his subsequent travels upon them.

This gave him a much greater mobility than his predecessors, because he needed only to carry two or three days' fodder at a time. Hence, one regular and unique item in his equipment was a scythe and rake, for mowing and collecting the grass.

On every journey he had to contend with rain, fog, sandstorms, and snowstorms. All were objectionable, but the fog was the worst, because it destroyed the visibility essential for map-making, and it might hang about for days; besides, it often necessitated tedious ascents of mountains several times before key points could be trigonometrically fixed.

Thoroddsen had his first taste of the joys of a wild life in 1876, when he accompanied Professor Jöhnstrup's expedition to study some of Iceland's many volcanoes. In 1881, when his own work began, he wisely devoted the first season to preliminary journeys, so as to acquire experience of the difficulties to be overcome. At first he travelled alone, but subsequently he was accompanied by a former pupil, O. Sigurddson. They had a small tent, two hardy Iceland ponies, and an absolutely minimum amount of equipment.

The start of the work proper, in 1882, was not auspicious. The ice-floes from the Greenland Sea, crowding close against the north

shore of the island, disseminated fog into the raw, damp air; and in addition to this difficulty, Thoroddsen could get no help and arouse no interest, for an epidemic of measles broke out, killing three in every hundred of the population.

Succeeding summers produced better results. He had much trouble and difficulty with his work on the north and north-east coasts, where high hills, and even mountains, descend straight into the sea, buttressed on every side by the precipitous walls of winding fjords. On the tiny flats at the heads of these fjords a few lonely fishermen's huts constituted the villages; more often only a single house was to be found within many miles, the whole region being almost uninhabited, except by myriads of wheeling, screaming sea-fowl. There was no communication between the various places other than that afforded by the slippery, treacherous, and almost obliterated paths up and down the cliffs; at times, says Thoroddsen, when he descended to sea-level the spray broke over him, and the horses had to be unloaded so as to pass projecting rocks.

Although he was received everywhere with the traditional hospitality of the Icelanders, the poor people rarely had much to offer him; fishermen, shepherds, and fowlers all, they

were often themselves dependent for a meal upon half-decayed gulls, seaweed, sharks' flesh, and other none too toothsome dainties. The results of this inadequate diet were that, despite their fine blue eyes and beautiful flaxen hair, the people often bore the marks of disease: scurvy, typhoid fever, and famine ever lurked in the vicinity of their homes.

When he was in this region it usually rained or snowed, or was cold and misty; while the mountains surrounding the fjords were knee-deep in snow, even during the summer. But the wild fascination of the black basalt cliffs, rising in one columnar layer above another, each the record of some ancient eruption; the rushing of the waterfalls, tumbling merrily down in giant steps from ledge to ledge, or perchance by one huge leap dissipating into thin air, and falling as rain; the beautifully poised flight of the gulls, with their ivory throats and their wicked beaks, as they fought in the air or swooped down upon the green waters of the fjord; above all, the sense of loneliness and remoteness, the charm of the unknown, and the knowledge that he was doing a work that had remained neglected too long, all these things spurred the undaunted teacher on.

During the winter, in the intervals of his work at the grammar school (a duty which at

a later stage was made honorary, but which must have borne heavily upon him at first), the results of these journeys were worked out. He wrote numerous articles for scientific papers; and you may imagine with what pleasure, pipe in hand, he would expound on some precious specimen, or discuss with a group of students the adventures and discoveries of the previous season. The language offered a difficulty, for if his scientific work were to be understood abroad, it must not be published in Icelandic. Accordingly, some articles appeared in Danish, some in Swedish, others were in German, and a general account of the whole appeared in our own tongue. All the scientific journals opened their columns to this plain, straightforward, and earnest student, and by that means, with the aid of correspondence, he kindled a growing interest in the breasts of foreign scientists, to whom Iceland has always been important, as it exposes phenomena that elsewhere are only seen under a mask. Gifts of books resulted, so that Thoroddsen gradually amassed that most valuable possession of a scientist, a good library. As his fame grew so his countrymen, at first neglectful, began to honour him, and eventually he was practically freed from his teaching duties, though still drawing his stipend.

In 1892, Thoroddsen fell ill, and had to go to a milder climate to recover. The next year he was back again; only to fall ill once more, this time with the dreaded typhoid. This was in the middle of the summer, the only practicable travelling season; yet he remarks of it, characteristically, "however, I had pretty nearly done all I had planned to do that year".

On the most interesting, though most desolate region of Iceland, the interior plateau, he could travel only from July to September; earlier in the year there was no grass in the oases, and after the middle of September the weather became too bad. The interior is absolutely lifeless. During the Great Ice Age, which terminated some thousands of years since, the whole of Iceland was covered by glaciers radiating from the mountains. The high points all lie near the coast, so that many glaciers streamed inland, down to the plateau. They carried on their frozen bosoms great numbers of stones, the smallest being mere gravel but the largest as big as a house. To trace these stones to their sources, and thereby to reconstruct the history of the old ice streams, furnished work for many a day. The determination of the history of the volcanoes was another of Thoroddsen's regular occupations;

and nowhere in the world could he have had better material. The walls of almost every fjord betrayed the history of eruptions in the greatest detail, flow above flow. The interior, likewise, was covered for vast distances by lava plains, the surface being sometimes coiled into fantastic ropes where the interior of the lava, cooling more rapidly than its crust, had forced up the latter; such places were often frightfully rough. Other flows were black and glassy, and many were half-hidden beneath a grey layer of dust, yet displaying their true nature in every cliff and gully. Besides the huge active cones, such as Hecla, there were many miniature volcanoes, little cones no bigger than a hillock, which, being bare of soil, displayed their structure like a diagram. All these things made his travels highly interesting to Thoroddsen, despite the difficulty of getting about.

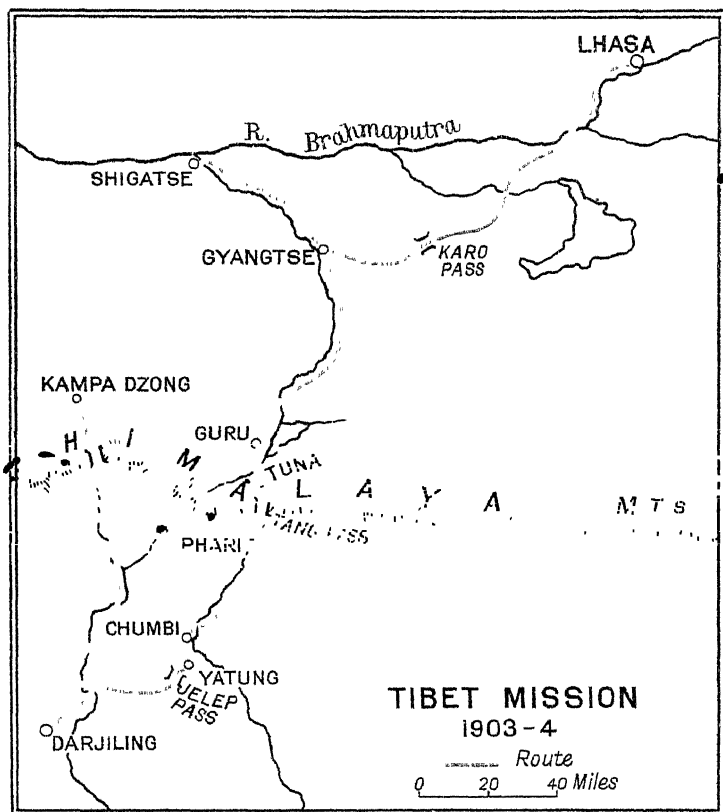
One obstacle that the traveller encountered on the plateau was the glacial streams, which are liable to sudden floods, and at all times are sprawling and white with suspended matter. Never cutting any very definite channels, they run in a dozen braided streamways, galloping over the rattling gravel, and sufficiently fast and treacherous to make a slip dangerous. Sometimes they were spread over so wide a

space that it took "a good hour or two" to ride across them.

A more formidable foe, and one which has on numerous occasions proved fatal to explorers, was the sandstorm. The loose surface, caught up by the high winds, would suddenly swoop down like a fog; myriads of tiny grains drifted into one's eyes, one's ears and nose—everywhere, in fact, where they could find a resting-place, and the journey had to come to an abrupt halt, for to wander about under such conditions might readily lead to destruction.

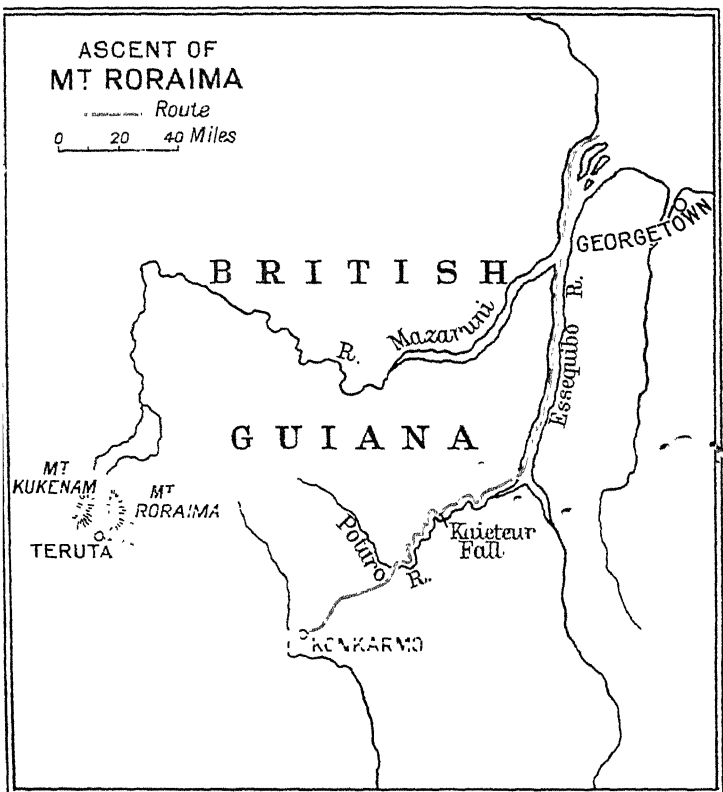
Dr. Thoroddsen lived more than twenty years after his great task ~~was~~ finished. He died at Copenhagen, full of honours, in 1921, being then in his sixty-sixth year. His life story is a sterling example of self-help and initiative, applied by a quiet student to one of the most useful of all labours, a knowledge of his own country.

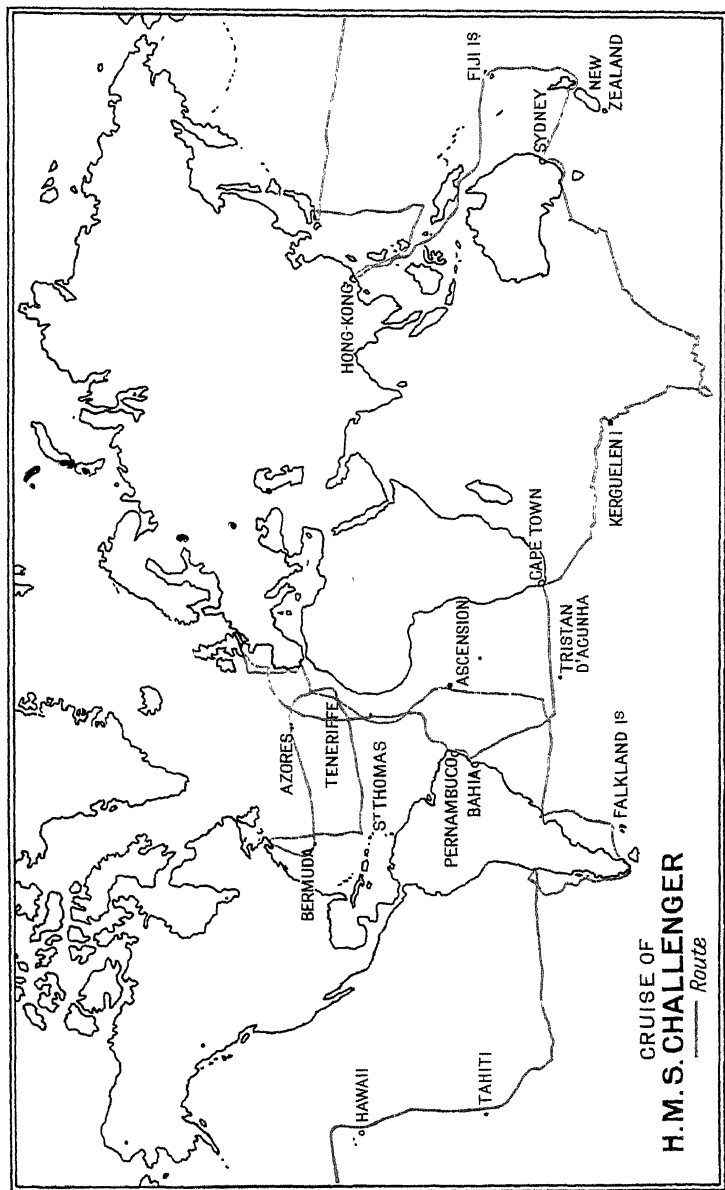
APPENDIX OF MAPS



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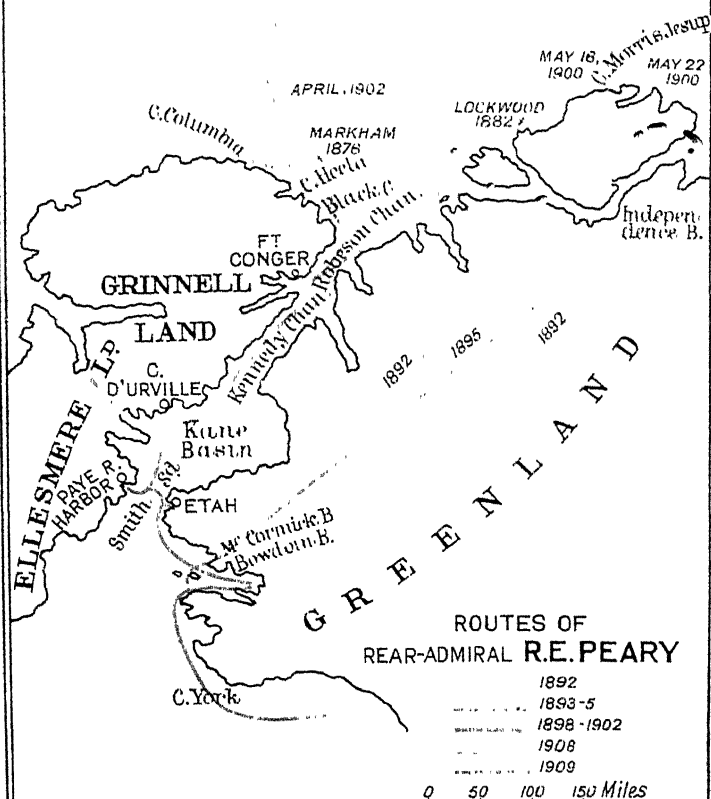


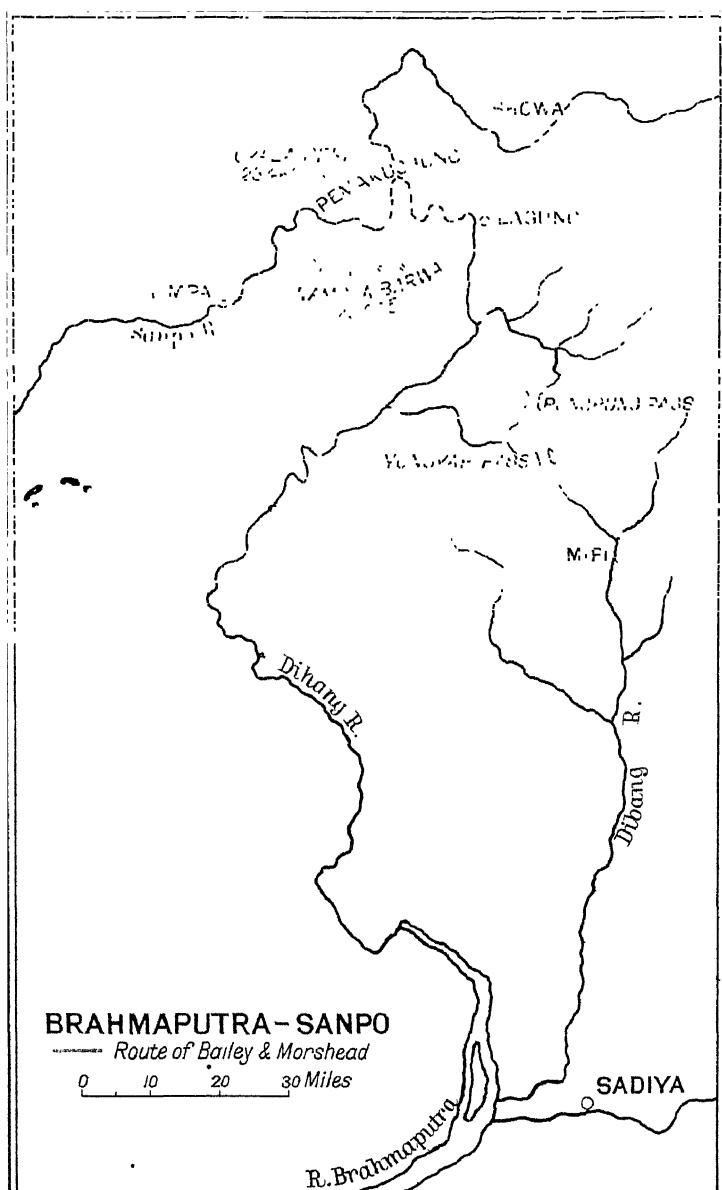
NORTH ★ POLE
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O C E A N





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